These remarkable fishes are marine and carnivorous. They possess considerable powers of swimming, but usually attach themselves to sharks and other fishes, whales, turtles or boats, and are thus carried about. They do no harm to the animal to which they attach themselves.

The Remora was known to the ancients and was by many thought to be the cause of the sudden retardation of ships and boats, whence its Greek name of " ship-holder " (see Gudger, Ann. Mag. Nat. Hist., (9), vol. ii, 1918, p. 271).

Fam. Echeneidae.

With the characters given above.

The family is widely distributed in all tropical and warm seas.

Key to the South African genera.

1. Pectoral acute.
   - *a.* Laminae on disc 10 . . . . . *Phtheirichthys.*
   - *b.* Laminae 20–28 . . . . . *Leptecheneis.*
2. Pectoral rounded . . . . . *Echeneis.*

Gen. Phtheirichthys Gill.

1862. Gill, Proc. Ac. Nat. Sci. Philad., p. 239.

Body slender and elongate. Sucking-disc with 10 laminae. Pectoral pointed. Caudal fin convex.

Phtheirichthys lineatus (Menz.).

Striped Sucker-fish.

1791. Menzies, Tr. Linn. Soc. Lond., vol. i, p. 187, pl. xvii, fig. 1.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 382.

1898. Jordan and Evermann, Fish. N. Mid. Amer., vol. iii, p. 2268.

Disc twice as long as wide, about equal to length of head and $6\frac{1}{2}$ in length of body. D X (=laminae on disc)+33. A 33. Maxilla reaching to or slightly beyond level of nostrils.

Length.—Up to 700 mm.

Colour.—Dark above, lighter below, sides with one or two whitish bands; fins, especially the caudal, with light margins.

Locality.—Table Bay.

Distribution.—Atlantic and Pacific Oceans.

A somewhat rare species which has been recorded as taken on barracudas (*Sphyraena*). There are only two specimens in the South African Museum.

Gen. Leptecheneis Gill.

1864. Gill, Proc. Ac. Nat. Sc. Philad., p. 60.

Body slender and elongate. Sucking-disc with 22–28 laminae (sometimes only 21). Pectoral pointed, caudal fin more or less convex in young, crescentic in adult.

Leptecheneis naucrates (Linn.).

Sucker-fish.

1758. Linné, Syst. Nat., ed. 10, p. 261.

1914. Gilchrist, Mar. Biol. Rep., vol. ii, p. 107 (habits) (*Echeneis remora* non Linn.).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 405 (references and synonymy).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 131 (references and synonymy).

Disc $2\frac{1}{2}$ times as long as broad, 4–$4\frac{1}{2}$ in length of body. Length of head 5–$5\frac{1}{4}$ in length of body. D XXII–XXVIII+32–41. A 32–38. Lower jaw very prominent. Maxilla reaching to level of nostrils.

Length.—Up to 800 mm.

Colour.—Brownish both above and below, a blackish band edged with white from snout through eye and along sides to tail; pectorals and ventrals blackish; dorsal, anal, and caudal with light margins.

Locality.—False Bay ? East London to Natal.

Distribution.—Warm seas.

Common on sharks and other large fishes.

Gen. Echeneis (Artedi) Linn.

1738. Artedi, Gen. Pisc., p. 14.

1862. Gill, Proc. Ac. Nat. Sc. Philad., p. 239 (*Remora*).

1896. Jordan and Evermann, Bull. U.S. Fish. Comm., 1895, p. 490 (*Remorina*).

Body shorter and more robust than in the preceding genera. Sucking-disc with 13–18 laminae.

Pectoral rounded, the rays soft and flexible. Caudal fin subtruncate.

Key to the South African species.

1. D XII–XIII+17–22 (*Remorina*) . . . . . *albescens.*
2. D XV–XVI+29–32 . . . . . *brachyptera.*
3. D XVII–XVIII+22–24 . . . . . *remora.*

Echeneis albescens Temm. and Schl.

Grey Sucker-fish.

1850. Temminck and Schlegel, Fauna Jap. Poiss., p. 272, pl. cxx, fig. 3.

1860. Günther, Ann. Mag. Nat. Hist., p. 401 (*clypeata*).

1860. *Id.*, Cat. Fish. Brit. Mus., vol. ii, pp. 376, 377 (*clypeata* and *albescens*).

1878–88. Day, Fish. India, p. 258., pl. lvii, fig. 2.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii (1903), p. 494.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 404 (*clypeata*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 131 (*clypeata*).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

1925. Jordan and Hubbs, Mem. Carn. Mus., vol. x, p. 294 (*Remorina a.*).

Disc $1\frac{1}{2}$ times as long as broad, $2\frac{3}{4}$–3 in length of body. Length of head 4 in length of body. D XII–XIII+17–22. A 20–22. Length of ventral equal to or less than postorbital part of head. Angle of mouth below or slightly behind nostrils.

Length.—Up to 300 mm.

Colour.—Uniform grey-brown.

Locality.—East London and Natal coast.

Distribution.—Indo-Pacific to Gulf of California.

One of the specimens was found attached to a Devil-fish (*Manta*) caught at East London.

Echeneis brachyptera Lowe.

1839. Lowe, Proc. Zool. Soc., p. 89.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 378.

1861. Castelnau, Mem. Poiss. de l'Afr. Austr., p. 73 (*laevis*).

1878–88. Day, Fish. India, p. 258, pl. lv, fig. 3.

Disc not quite twice as long as broad, about $3\frac{1}{3}$ in length of body. Length of head about $4\frac{1}{4}$ in length of body. D XV–XVI+29–32.

A 25–27. Length of ventral rather more than postorbital length of head. Angle of mouth reaching almost to level of anterior margin of eye. Lower jaw more or less angular.

Length.—Up to 300 mm.

Colour.—Uniform grey-brown.

Locality.—Table Bay.

Distribution.—Atlantic and Indo-Pacific Oceans.

Echeneis remora Linn.

Remora ; Sucker-fish ; Lootsman.

1758. Linné, Syst. Nat., ed. 10, p. 260.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 406 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 133 (references and synonymy).

Disc twice as long as broad, $2\frac{1}{2}$–3 in length of body. Length of head about $3\frac{3}{4}$ in length of body. D XVII–XVIII+22–24. A 25. Length of ventral greater than postorbital length of head. Angle of mouth reaching almost to level of anterior margin of eye. Lower jaw rounded. (Plate XVIII, fig. 1.)

Length.—Up to 375 mm.

Colour.—Uniform brown or blackish.

Locality.—Natal coast.

Distribution.—Warm seas.

Division 18. XENOPTERI.

Sucker fishes ; Cling-fishes.

Air-bladder absent. No mesocoracoid. Head and anterior part of body broad and depressed, hind part of body compressed. Skin naked. Operculum reduced to a spine-like projection. Gill-arches reduced. All fins without spines. Dorsal and anal far back. Pectoral large. Ventrals jugular, of 4–5 rays, forming the sides of a large ventral adhesive disc which may be single or divided into two portions. Gill-openings narrow. Branchiostegal rays 5–6. Gills 3 or $3\frac{1}{2}$. Pseudobranchiae well developed. Teeth incisiform or villiform in both jaws, none on vomers or palatine.

Marine, carnivorous fishes of small size living between tide-marks or in shallow water in tropical and temperate regions. They cling

to rocks by means of the ventral sucking-disc and considerable force is usually required to dislodge them ; the best way to capture them is to slide them suddenly sideways, at the same time pulling them away from the rock. If they are in a rock-bound pool the water may be poisoned. They live a long time out of water.

A single family.

Fam. Gobiesocidae.

With the characters given above.

In those species whose breeding habits are known the eggs are attached in some sheltered position such as a crevice in the rocks or the inside of an empty mussel-shell. The young are at first pelagic and only come inshore when the ventral sucker begins to develop.

The male has a conical papilla behind the vent which serves as an intromittent organ as in the Blennies.

Key to the South African genera.

1. Head very broad. A short caudal peduncle . . . *Chorisochismus.*
2. Head not very broad. Dorsal and anal fins confluent with the caudal *Lepadichthys.*

Gen. Chorisochismus Barnev.

1846. De Barneville, Rev. Zool., p. 409.

1861. Castelnau, Mem. Poiss. de l'Afr. Austr., p. 72 (*Athaena*).

Ventral disc single, *i.e.* the posterior half has no free anterior margin. Head very broad and depressed. A short caudal peduncle. Operculum with a blunt spine. Gills $3\frac{1}{2}$. Gill-membranes united to the isthmus. Jaws with a single series of large conical or incisiform teeth in front, with a band of smaller granular teeth behind them.

A South African genus with one species.

Chorisochismus dentex (Pall.).

Sucker-fish ; Klip-zuiger.

1779. Pallas, Spicil. Zool., vol. vii, p. 6, pl. i.

1861. Castelnau, *loc. cit.*, p. 72 (*dentex* and *fimbriatus*, and *Athaena fasciata*).

1903. Gilchrist, Mar. Invest. S. Afr., vol. ii, p. 193, pl. ii, figs. 17–20 (egg and larva).

1914. *Id.*, Mar. Biol. Rep., vol. ii, p. 106 (habits).

1916. *Id.*, *ibid.*, vol. iii, p. 13, fig. 10 (egg and larva).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 143 (references).

Greatest breadth of head about equal to its length, and $2\frac{1}{5}$–$2\frac{1}{3}$ in length of body. Eye $1\frac{1}{2}$–$1\frac{3}{4}$ in snout, $4\frac{1}{2}$–5 in length of head. Maxilla reaching to below anterior margin or anterior third of eye. Anterior nostril with a short fringed tentacle. Lips papillose within. D 8–10. A 7. Dorsal arising in advance of anal. (Plate XVIII, fig. 3.)

Length.—Up to 300 mm.

Colour.—Uniform or variously mottled, usually more or less reddish, but to a great extent harmonising with the rocks and weeds among which it lives.

Locality.—Table Bay, False Bay, Mossel Bay, Knysna. The eggs are attached to stones and shells.

Gen. Lepadichthys Waite.

1904. Waite, Rec. Austr. Mus., vol. v, No. 3, p. 180.

Ventral disc single. Head not very broad. Dorsal and anal fins confluent with the caudal fin.. Operculum without apparent spine. Gills 3. Gill-membranes united to isthmus. Jaws with a single series of incisor teeth.

This genus is found in Australia and South Africa.

Lepadichthys coccinotaenia Regan.

Natal Sucker-fish.

1921. Regan, Ann. Durban Mus., vol. iii, pt. 1, p. 2.

Greatest breadth of head $5\frac{1}{2}$, length of head $3\frac{1}{3}$, in length of body. Eye 2 in snout, $5\frac{1}{2}$ in length of head. Maxilla reaching to midway between tip of snout and eye. D 12–13. A 10–11. Dorsal arising a short way in advance of anal.

Length.—Up to 40 mm.

Colour.—Yellowish, a scarlet stripe from upper lip through eye to operculum.

Locality.—Natal coast.

Type in British Museum.

In colour this species appears to resemble exactly the Australian *L. frenatus*, but differs in having fewer rays in the dorsal and anal fins.

Division 19. PERCOMORPHI.

Air-bladder without an open duct (physoclystic). No mesocoracoid. Ventral fins of a spine and 5 rays, or variously reduced; thoracic, subthoracic, or jugular in position. Dorsal and anal fins normally with spines. Operculum well developed, and gill-openings usually large.

This division is by far the largest and it is difficult to construct a comprehensive definition for the whole division. It is difficult even to form definitions for the component groups and the following key contains scarcely any characters which are exclusively confined to any one group.

A little study, however, will soon enable the student to place a particular fish in its correct group by the general "facies." The Silver-fish and Rock-cod, the Jacopever and Gurnard, the Klip-fish, the Dikkop, the Snoek and Mackerel, are easily recognisable and will serve as the typical members of their respective groups, and with which the student will soon learn to associate the other members.

Synopsis of the groups.

I. No suborbital stay or process extending from below eye towards preopercle.

A. Ventrals thoracic, subthoracic, or jugular. Scales usually ctenoid . . . . . *Percoidei.* p. 426.

B. Ventrals thoracic. Body compressed. Scales minute. Anal spines 2–3. Mouth small, not protractile . . . . . *Teuthidoidei.* p. 776.

C. Ventrals thoracic. Body compressed. Scales minute. Anal spines 7. Ventrals with 2 spines and 3 intervening rays . *Siganoidei.* p. 784.

D. Ventrals thoracic or subthoracic. Dorsal and anal fins often with detached finlets posteriorly. Strong swimmers, living in the open ocean . . . . . *Scombroidei.* p. 786.

E. Ventrals thoracic or subjugular, often united to form an adhesive disc. Usually small fishes with cylindrical bodies and large heads, often depressed. Shallow, coastal waters, sometimes in estuaries and rivers . . . . . *Gobioidei.* p. 808.

F. Ventrals jugular or mental, often reduced or absent. Coastal and deep-water fishes . . . . . *Blennioidei.* p. 831

G. Ventrals abdominal or subthoracic, often reduced or absent in adult. Scales small, cycloid, often deciduous, or absent. Teeth in the gullet behind pharynx. Pelagic or deep sea . . . *Stromateoidei.* p. 889.

II. A bony stay extending from below eye to preopercle. Head usually with bony knobs or prominences, often heavily armoured . *Scleroparei.* p. 899.

Group PERCOIDEI.

1913. Regan, Ann. Mag. Nat. Hist., (8), vol. xii, p. 111 (classification).

Body usually oblong, with scales which are typically ctenoid. Lateral line present. Head usually laterally compressed, cheeks and opercles scaly. Dorsal fin various, but always with some spines in front which are typically stiff and pungent. Anal usually short, with spines in front, rarely without spines. Ventrals thoracic, subthoracic, or jugular. No bony stay for preopercle. Air-bladder usually present. Pseudobranchiae as a rule present.

It should be understood that the above is a very general definition and many of the characters may be modified in the various families.

The arrangement of the families, especially the families of the *Perciformes*, is purely for the sake of convenience, though Regan's order has been adhered to as far as possible.

Key to the South African families.

I. Gills 4, a slit behind 4th, or if only 3½ (*Uranoscopidae*) then head depressed, armoured, with vertical mouth.

A. Ventrals absent (in S. African species) (*Ammodytiformes*) *Ammodytidae.*

B. Ventrals present, with 4–5 soft rays.

1. Anal with only 1–2 feeble spines.

a. Pectoral narrow, with oblique base. Angle of preopercle with a single spine. Two separate dorsals (*Champsodontiformes*).

i. With scales . . . . *Champsodontidae.*

ii. Without scales . . . . *Chiasmodontidae.*

b. These characters not combined. Base of pectoral vertical.

i. Ventral fins close together (*Trachiniformes*).

α. Mouth vertical or very oblique.

* Head armoured, gills 3½ . *Uranoscopidae.*

** Head not armoured, gills 4 . *Trachinidae.*

β. Mouth horizontal or nearly so.

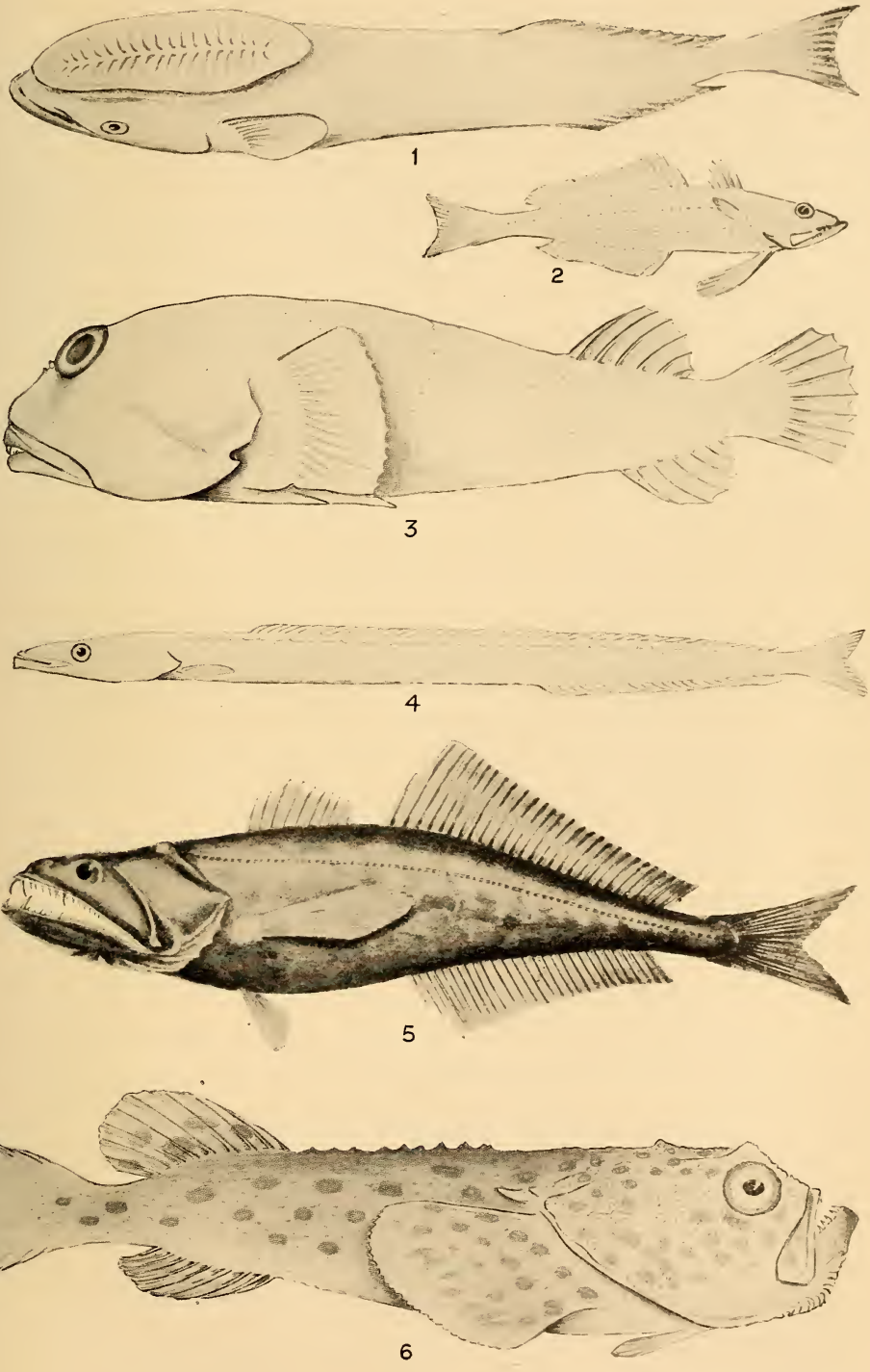
* Spinous dorsal very short . *Pinguipedidae.*

** Spinous dorsal equal to soft dorsal *Opisthognathidae.*

ii. Ventral fins widely separated. Head and body depressed (*Callionymiformes*) . . . *Callionymidae.*

PLATE XVIII.

FIG.		TEXT-PAGE
1.	*Echeneis remora* Linn. (original)	422
2.	*Champsodon capensis* Regan (original)	432
3.	*Chorisochismus dentex* (Pall.) (original)	423
4.	*Ammodytes capensis* n. sp. (original)	431
5.	*Chiasmodon niger* Johns. (after Alcock)	434
6.	*Pleuroscopus pseudodorsalis* n.g. et sp. (original)	437



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2. Anal with more than 2 spines.
   a. Lower pectoral rays simple (*Cirrhitiformes*).
      i. D X 11–14 . . . . . *Cirrhitidae.*
      ii. D XVI–XIX 23–33 . . . . *Chilodactylidae.*
   b. Lower pectoral rays branched. Body compressed. Ventrals not wide apart. Gill-openings not reduced. (*Perciformes*) . . . . key to families (*vide infra*).

II. Gills $3\frac{1}{2}$. Head and body more or less compressed.
   A. A single nostril on each side (*Pomacentriformes*) . . *Amphiprionidae.*
   B. Two nostrils on each side (*Labriformes*).
      1. Teeth separate, usually canine-like . . . . *Labridae.*
      2. Teeth coalesced to form a pair of plates like a beak . *Scaridae.*

Key to the South African families of Perciformes.

I. Without scaly process in axil of ventral fin.
   A. Fins with spines (sometimes absent in anal fin).
      1. A single dorsal fin (see footnote *).
         a. Teeth normal, separate.
            i. Anal spines (if present) 3.
               α. Scales smooth. Mouth not very oblique.
                  * Dorsal and anal fins not in a sheath.
                     † Five ventral rays . . *Serranidae.*
                     †† Two to four ventral rays *Plesiopidae.*
                  ** Dorsal and anal fins in a sheath *Kuhliidae.*
               β. Scales hard, rough (text-fig. 20). Mouth very oblique. Pseudobranchiae very large *Priacanthidae.*
            ii. Anal spines 2 . . . . . *Branchiostegidae.*
            iii. No anal (or dorsal) spines. Body elongate. Dorsal and anal confluent with caudal . . *Cepolidae.*
         b. Teeth fused to form two prominent cutting edges, like a parrot-beak . . . . . *Hoplegnathidae.*
      2. Two dorsal fins (see footnote *).
         a. Maxilla concealed . . . . . *Sillaginidae.*
         b. Maxilla exposed.
            i. Anal spines normal, contiguous with soft rays.
               α. Dorsal spines low and feeble.
                  * Canine teeth in both jaws . *Pomatomidae.*
                  ** Teeth villiform, in bands [*Rhachycentridae.*]
               β. Dorsal spines well developed . *Apogonidae.*
            ii. Two anal spines separate from rays . *Carangidae.*
   B. No spines in the fins . . . . . *Coryphaenidae.*

II. With or without scaly process in axil of ventral fin. Caudal never forked *Sciaenidae.*

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* *Apolectus* among the *Carangidae* has a single long dorsal, with the spines rudimentary, at least in adult. The anal spines are also indistinct.

III. With scaly process in axil of ventral fin (absent in *Pristipomoides* of the *Lutianidae*, and in some *Monodactylidae*).
A. Two nostrils on either side.
1. Two dorsal fins . . . . . *Mullidae.*
2. One dorsal fin.
a. All teeth absent. Mouth strongly protractile *Emmelichthyidae.*
b. Teeth present.
i. Body strongly compressed, often elevated. Usually no vomerine or palatine teeth.
α. Maxilla broad. Caudal forked. Scales cycloid.
* D and A with articulated rays, scaly *Bramidae.*
** D and A with unarticulated spines, not scaly, but with conspicuous basal sheath . . . *Pteraclidae.*
β. Maxilla not broad, more or less concealed. Caudal rounded, truncate, or emarginate.
* Gill-membranes more or less attached to isthmus. Gill-rakers rudimentary. Soft dorsal and anal scaly.
† Pectoral falcate. Scales cycloid *Drepanidae.*
†† Pectoral short. Scales ctenoid.
§ Anal spines 3.
‡ Gill-membranes broadly attached to isthmus *Chaetodipteridae.*
‡‡ Gill-membranes narrowly attached to isthmus *Chaetodontidae.*
§§ Anal spines 4 . *Scatophagidae.*
** Gill-membranes free from isthmus. Gill-rakers well developed. Soft dorsal and anal scaleless . . *Histiopteridae.*
ii. Body moderately compressed, or sometimes strongly compressed and elevated. Maxilla not broad, often wholly or partly concealed.
α. No pseudobranchiae . . *Liognathidae.*
β. Pseudobranchiae present.
* Gill-membranes broadly united, but free from isthmus. With canine teeth *Lethrinidae.*
** Gill-membranes scaly, and united to isthmus *Girellidae.*
*** Gill-membranes free from isthmus.
† Caudal rounded . . *Lobotidae.*
†† Caudal forked or emarginate (at least in adult, young sometimes truncated or rounded).

Families of Perciformes—III, A, 2—*continued.*

§ Vomerine and palatine teeth present (minute and often deciduous in *Scorpididae*).
‡ Ventrals small or reduced. Body elevated
Monodactylidae.
‡‡ Ventrals well developed.
¶ Dorsal deeply notched
Centropomidae.
¶¶ Dorsal not, or not deeply, notched.
× Soft dorsal and anal about equal.
° Branchiostegal membrane scaly
Kyphosidae.
°° Branchiostegal membrane scaleless
Lutianidae
Scorpididae.
×× Soft dorsal much shorter than anal
Pempheridae.
§§ Vomerine and palatine teeth absent.
‡ Caudal emarginate
Plectorhynchidae.
‡‡ Caudal forked.
¶ Teeth villiform
Maenidae.
¶¶ Teeth strong, incisor-like in front, more or less molar-like laterally, with or without canines
Sparidae.

B. A single nostril on either side . . . . . *Cichlidae*

Fam. 1. Ammodytidae.

Sand-eels.

1904. Gill, Proc. U.S. Nat. Mus., 28, p. 159 (affinities).

1906. Jordan, *ibid.*, 30, p. 715.

1918. Fage, Dan. Ocean. Exp., vol. ii, A 3, p. 16 (post-larval stages).

Body elongate, naked, or wholly or partly covered with small cycloid scales. Head long. Eyes lateral. Mouth rather large, protractile. Lower jaw projecting. Maxilla excluded from border of upper jaw. Teeth small or wanting. Vomer prominent, sometimes with dentiform tubercles. Gill-openings wide, membranes separate or united, free from isthmus. Pseudobranchiae large. Gill-rakers long and slender. Gills 4, a slit behind 4th. Vertical fins without spines. Caudal small, free, forked. Pectorals rather small, inserted low down. Ventrals, if present, jugular, consisting of 1 spine and 3 soft rays. No air-bladder. Usually only 1 pyloric caecum. Lateral line single.

A small family, about whose systematic position there has been much discussion, consisting of 5 genera and about twice as many species from the temperate and subarctic regions of the Northern Hemisphere, and India.

The Sand-eels or Launces are small carnivorous fishes living on sandy shores and swimming in shoals. By means of their sharp-pointed snout they are able to bury themselves with great rapidity in the sand.

The eggs are demersal, being attached to sand-grains, but if dislodged they become planktonic.

Sand-eels are excellent as food, but are seldom captured in South African waters in sufficient quantity.

Gen. Ammodytes (Art.) Linn.

1738. Artedi, Genera Pisc., p. 16.

1758. Linné, Syst. Nat., ed. 10, p. 247.

Body either completely scaled and with numerous oblique folds of the skin ; or with scales only on the posterior third and without any oblique folds of skin. Lateral line following line of back. A fold of skin along each side of the belly. Premaxillae protrusible. Jaws toothless. Vomer prominent but unarmed. Dorsal fin elongate, with 50–70 rays, much longer than anal. Ventrals absent. Gill-membranes separate.

Northern Pacific and Atlantic, Mediterranean.

Ammodytes capensis n. sp.

Cape Sand-eel.

1906. Gilchrist, Mar. Invest. S. Afr., vol. iv, p. 159 (*siculus ?*).

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 94 (*siculus* non Gnthr.).

Depth 13½–14 in length, equal to length of mandible, and 3 in length of head, which is 4⅔–4¾ in length of body. Eye 2 in snout, equal to interorbital width, 7½ in length of head. Maxilla extending to below anterior margin of eye, or a little further. D 49–51. A 24–26. Margins of dorsal and anal undulate. Pectoral slightly longer than lower jaw. Scales on posterior part of body only, commencing about at level of middle of anal; no oblique folds of skin. Lateral line consisting of a closed canal, opening by a series of 46 pores above the line and twice as many below; open pores ceasing at a distance from base of caudal equal to about twice the depth of body. (Plate XVIII, fig. 4.)

Length.—Up to 165 mm.

Colour.—Bluish or greenish above, more or less silvery, a brilliant silver lateral stripe.

Locality.—Table Bay, False Bay, " Kaffrarian " coast.

Type in South African Museum.

This species has already been recorded from South Africa as provisionally the same as the Mediterranean and N. Atlantic species *siculus* Swains. (=*cicerellus* Raf.). Examination of several specimens, however, convinces me that it should be regarded as specifically distinct. The numbers of dorsal and anal rays are very constant and distinctly less than in *siculus*. The number of pores in the lateral line in *siculus* is not given by either Günther or Smitt; there may possibly be a difference in this respect also between the northern and southern forms.

Fam. 2. Champsodontidae.

Body rather elongate, with small rough ctenoid scales. Head not very long. Eyes subdorsal; a small hair-like filament over each eye. Mouth large. Lower jaw projecting. Maxilla excluded from upper border of mouth. Teeth slender, in 1 or 2 series in jaws; vomerine teeth cardiform, in 2 patches; palatine teeth absent. Gill-openings very wide. Gill-membranes separate, free from isthmus. Pseudobranchiae rather small. Gill-rakers moderately long. Gills 4, a slit behind 4th. Angle of preopercle with a strong spine; margin of opercle denticulate. Two dorsals, the 1st of 5 spines. Anal with 1 feeble spine. Caudal free, forked. Pectorals small, with oblique

bases. Ventrals rather large, of 1 spine and 5 rays, inserted slightly in advance of pectorals, close together. Air-bladder present. Pyloric caeca moderate in number. Lateral line double, with transverse branches.

Carnivorous fishes from shallow or moderately deep water in the Indo-Pacific and Australian regions.

Gen. Champsodon Gnthr.

1867. Günther, Proc. Zool. Soc., p. 102.

1895. Ogilby, Proc. Linn. Soc. N.S.W., (2), 10, p. 320 (*Centropercis*).

1908. Regan, Tr. Linn. Soc. Lond. Zool., (2), vol. xii, pt. 3, p. 242 (synopsis of species).

1922. McCulloch, Austr. Zool., vol. ii, pt. 3, p. 100.

With the characters of the family.

McCulloch is perfectly justified in uniting *Centropercis* with *Champsodon*. The Cape species shows naked transverse bands and naked abdominal area, though these naked areas are not so large as in *C. nudivittis* (Ogilb.). Regan neither mentions nor figures these features for the Cape species, though the figure of *C. sechellensis* shows the naked abdominal area. These naked areas are best observed when the fish is partially dried.

Champsodon capensis Regan.

1908. Regan, *loc. cit.*, p. 244, pl. xxvii, fig. 2.

1914. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xiii, pt. 3, p. 84.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 101.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 318.

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii., p. 58.

Depth $5\frac{1}{3}$–6, length of head $3\frac{1}{2}$–4, in length of body. Eye slightly less than snout, greater than interorbital width, 4–5 in length of head. Premaxilla doubly notched in front. Preorbital with 2 divergent downwardly directed spines. Preopercular spine not extending more than half-way towards base of pectoral. Maxilla extending slightly beyond vertical from hind margin of eye. Teeth in lower jaw in a double series, those of the outer row much smaller and more irregular. Gill-rakers 10 on lower part of anterior arch. D V+I 19–20. A I 17. Ventrals extending to vent. Scales ctenoid on head and body, absent only from opercular margin, from a subtriangular area between vent and bases of pectorals and ventrals, from the narrow transverse bars occupied by the sensory pores and papillae, and from a narrow

strip along bases of dorsals and anal. The naked transverse bars are not continuous across the lateral lines (as they appear to be in *C. nudivittis*). Each pore on the lateral lines, in the transverse series, and on the head has beside it a small outstanding papilla. Pyloric caeca 9. (Plate XVIII, fig. 2.)

Length.—Up to 100 mm.

Colour (as preserved).—Yellowish or light brownish, more or less silvery. Back darker, often a series of dark spots or bars along sides.

Locality.—False Bay, Agulhas Bank to Natal, 14–240 fathoms.

Type in British Museum.

Fam. 3. Chiasmodontidae.

Body elongate, naked, or with fine spinuloid scales. Head elongate, depressed. Eyes lateral. Mouth very large, reaching beyond eyes; lower jaw slightly longer than upper. Premaxilla not protractile. Both jaws with long, unequal teeth, the front ones movable; teeth on palatine similar to those on jaws; vomerine teeth usually absent. Opercle reduced. Gill-openings very wide. Gill-membranes united only quite anteriorly. Preopercle with a small spine at its angle. Gills 4, a small foramen behind 4th. Pseudobranchiae absent.* Gill-rakers absent. Two dorsals, the 1st of 10 spines, much shorter than 2nd. Anal without or with a very feeble spine, similar to 2nd dorsal. Caudal free, forked. Pectorals slender. Ventrals thoracic, of 1 spine and 5 rays. Air-bladder present. Pyloric caeca absent. Lateral line single.

This family contains a few carnivorous deep-sea fishes. The enormous gape of the mouth and the distensibility of the belly enables them to swallow other fishes larger than themselves.

The position of this family is a little uncertain. Weber assigns 6 genera to it, including *Champsodon*.

Gen. Chiasmodon Johns.

1863. Johnson, Proc. Zool. Soc., p. 408.

1864. Günther, Cat. Fish. Brit. Mus., vol. v, p. 435 (*Chiasmodus*).

With the characters of the family. Nostrils in the middle of the snout. No spine on angle of preopercle.

* Alcock (1899) states that the pseudobranchiae are well developed in a specimen from the Indian Ocean, which he at first named *Ponerodon vastator*, but later identified as *Chiasmodus niger*. For this and other reasons Brauer (1906) doubts whether the Indian Ocean fish really belongs to the genus *Chiasmodus*. Weber (1913) is of the same opinion and considers *Ponerodon* as a well-established genus.

**Chiasmodon niger* Johns.

1863. Johnson, *loc. cit.*, p. 408.

1895. Goode and Bean, Ocean. Ichthyol., p. 292, figs. 264, 264A.

1899. Alcock, Cat. Deep-sea Fish. Ind. Mus., p. 50.

1900. *Id.*, Illustr. Zool. "Investigator," pl. xxviii, fig. 3.

1906. Brauer, Wiss. Ergebn. D. Tiefsee Exp., vol. xv, pt. 1, p. 254.

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 12 (*Chiasmodus n.*) (references).

Depth $4\frac{1}{4}$, length of head $3\frac{1}{4}$–$3\frac{1}{2}$, in length of body. Eye $4\frac{1}{2}$–$5\frac{1}{2}$, in length of head, 2 in snout, about half interorbital width. Maxilla reaching almost to angle of preopercle. Vomerine teeth absent. D X+I 28. A 27–29. P 12–13, equal to length of head without snout. Ventrals about half length of pectorals. Skin naked. Branchiostegals 7 or 8. (Plate XVIII, fig. 5.)

Length.—Up to 162 mm.

Colour.—Black or violet-black.

Locality.—Off Table Bay, 1500 fathoms.

Distribution.—North and Middle Atlantic, West Indies, 312–1500 fathoms.

A second species, *C. subniger* Garm., occurs off the Gulf of California at 919 fathoms, characterised by the presence of vomerine teeth, and "fine spinuloid scales presenting a pilose appearance." Alcock notes the thick mucous with which the skin of *C. niger* is covered, and it is possible that this species also possesses very fine spinulose scales which have been overlooked.

Weber (1913, Siboga Exp. Monogr., 57, p. 147) diagnoses a third species which is apparently differentiated from *C. niger* by having 9 pectoral rays instead of 12–13, and 6 branchiostegals instead of 7 or 8.

Fam. 4. Uranoscopidae.

Stargazers; Puffers.

Body elongate, subcylindrical, naked or with very small, cycloid scales which are often arranged in oblique series. Belly always naked. Head large, broad, with the bones exposed, giving it an armoured appearance. Eyes small, as a rule dorsally situated. Mouth vertical or nearly so, lower jaw prominent. Teeth villiform or conical on jaws; usually 2 separate patches on vomer (but sometimes continuous); teeth on palatines. Opercle large. Preorbital and 1st suborbital bones forming a shelf. Premaxilla protractile. Maxilla

broad, without supplemental bones, excluded from margin of upper jaw, exposed. Gill-openings wide. Gill-membranes nearly separate, free from isthmus. Gills $3\frac{1}{2}$, no slit behind last. Pseudobranchiae present. Spinous dorsal very short or absent. Soft dorsal and anal moderately long. Caudal free, truncate. Pectorals broad. Ventrals jugular, close together, of 1 spine and 5 rays. Air-bladder absent. Pyloric caeca in moderate number. Lateral line single, usually high up.

Carnivorous, bottom-dwelling fishes from shallow or moderately deep water in warm regions.

An account of the habits of Stargazers is given by Gill (Smiths. Misc. Coll., vol. xlviii, p. 404, 1907). These fishes lie almost completely buried in the sand or mud, with only their eyes and mouths projecting. Any unwary fish or Crustacean coming within reach is immediately snapped up by the powerful jaws. Several species possess a curious long worm-like filament attached to a membrane or "valve" just inside the lower jaw. This filament is used as a decoy to lure prey within reach of the jaws. It is very mobile and is thrust out between the lips and waved about, coiled and uncoiled, so that its resemblance to a real worm is exceedingly close. Those species of Stargazer which do not possess this filament have perforce to wait until their prey approaches near enough to be seized.

The eggs are pelagic. For the post-larval stages see Fage (1918, Dan. Ocean. Exp., vol. ii, A 3, p. 122).

Key to the South African genera.

1. Spinous dorsal present . . . . . *Uranoscopus.*
2. Spinous dorsal absent . . . . . *Pleuroscopus.*

Gen. Uranoscopus Linn.

1758. Linné, Syst. Nat., ed. 10, p. 250.

Body scaly. Scales imbricate, arranged in oblique rows. Top of head almost entirely bony. Ramus of lower jaw not dilated. Eyes dorsal. Opercles free all round, with small fringe. Gill-openings extending upwards and forwards in front of suprascapular region. A strong humeral spine, but no fringed appendage. Acute downwardly directed spines on preopercle, and a similar spine on subopercle. Two or three spines pointing forwards on the pelvis. Spinous dorsal present, consisting of 4 flexible spines. Membrane inside the lower jaw frequently with a protrusible filament. Lateral line running close to base of soft dorsal.

Uranoscopus archionema Regan.

Stargazer.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 190 (*occidentalis* non Agassiz).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 414 (*occidentalis* non Agassiz).

1921. Regan, Ann. Mag. Nat. Hist., (9), vol. vii, p. 417.

1921. *Id.*, *ibid.*, p. 417, footnote (*haplostoma*).

Depth 4–4½, length of head 2½ (young)–3, in length of body. Eye 4–5 in length of head, subequal to interorbital width, and a little greater than snout. Bones of upper surface of head roughly granular, with blunt radiating ridges. Depth of suborbital equal to or slightly greater than that of naked space below it. Four to five preopercular spines, 1 or 2 of them often double, so that there may be 7 spines in all. Two, sometimes 3, blunt preorbital spines. Two divergent supraclavicular spines, the inner short. Humeral spine externally grooved, 3–4 in length of head. Anterior nostril tubular. Upper and lower lips fringed with papillae. Intralabial membrane or " valve " usually with a small, pointed, median projection, which, however, is variable in size and may be quite obsolete. Teeth in lower jaw in a single series, but with a few additional inner ones at the symphysis, increasing in size posteriorly, the hindermost 2 usually conspicuously larger than the others ; the band in the upper jaw narrowing to a single row of teeth posteriorly ; palatines with a single row ; vomerine patches separate or forming a continous transverse band. D III . I 13, 3rd and 4th soft rays longest. A 13–14, length of its base equal to its distance from hind end of base of ventrals or from the 3 spines on pelvis. P 17–18. Scales in 52–56 oblique rows. Pyloric caeca 9.

Length.—Up to 330 mm.

Colour.—Greyish or brownish, the upper part of the body usually with numerous round pale spots, the dark ground colour forming a reticulate pattern ; spinous dorsal black with a narrow whitish border ; pectoral greyish with light margin.

Locality.—Mossel Bay, Algoa Bay, East London, Natal and Zululand coast, 27–120 fathoms.

Types of *archionema* and *haplostoma* in British Museum ; topotypes of *archionema* in South African Museum.

Examination of a large series of specimens shows that all the characters relied upon for distinguishing *haplostoma* are inconstant and are

neither sexual nor age differences. The length of the base of anal is sometimes less than its distance from hind end of base of ventrals.

Pleuroscopus n. g.

Body scaly. Scales thickened, subtubercular, not imbricate except at base of tail, but scattered more or less closely on the surface, not in pits. Top of head almost entirely bony. Interorbital very broad. Ramus of lower jaw dilated near symphysis, but without spinose projection. Eyes lateral, each surmounted by a strong supraorbital tubercle. Opercle not free above, without fringe. Gill-openings not extending above upper end of pectoral base. A strong humeral spine, but no fringed appendage. No spines on pre- or sub-opercle. A group of conical tubercles on the pelvis. Spinous dorsal absent, but represented by a series of short, immovable tubercles. Soft dorsal and anal short. Membrane inside lower jaw without filament. Lateral line obscure, running nearly in middle of side. Vent far back.

The remarkable fish, for which this genus is proposed, is distinguished from all other Uranoscopids by the laterally placed eyes, the series of tubercles representing the last trace of the obsolete spinous dorsal fin, and the very short soft dorsal and anal fins. In most other respects it resembles *Gnathagnus* Gill from Japanese and Australian seas.

Pleuroscopus pseudodorsalis n. sp.

Spotted Puffer.

Body depressed anteriorly, compressed posteriorly. Depth $4\frac{1}{3}$, length of head $2\frac{2}{3}$, in length of body. Greatest width of head $\frac{9}{11}$ of length. Bones of head strongly granular, naked areas very narrow. Eye subequal to snout, $2\frac{1}{2}$ in interorbital width, $4\frac{4}{5}$ in length of head. Suborbital as deep as vertical diameter of eye. Preorbital without projecting spines. Lower margin of preopercle and subopercle without spines, but with irregularly spaced granular tubercles which are larger than the other granules on head. Two short and low occipital ridges distant from one another one eye-diameter. Humeral spine about as long as eye-diameter, its base overlapped by the flat bluntly pointed posterior end of the granulose supraclavicular. A low, horizontal ridge across the upper part of opercle. Lower jaw granular, the granules largest near the symphysis; inner margin of ramus expanded near symphysis. Teeth in lower jaw in a single series, subequal; 2 rows in upper jaw, smaller than those in lower jaw except

the 2 median pairs ; a single row on palatine, and a transverse single row of 8 on vomer. Lips not fringed. Intralabial membrane with entire margin without protrusible filament. Gill-rakers obsolete. Branchiostegals 6, enclosed in thick fleshy folds. Anterior nostril with short, pointed filament on its posterior margin. D IX+II 8. The 1st dorsal is represented by 9 short, conical, bifid or multifid, immovable tubercles, commencing in a line with apex of humeral spine, distant about 7 mm. one from another. The 2nd dorsal commences about the same distance from the last immovable tubercle ; the 1st spine is very short (4 mm.), but is freely movable and connected by membrane with the 2nd, which equals half the eye-diameter in length ; 4th soft ray longest, twice the eye-diameter. A II 8, opposite soft dorsal, the 2 spines feeble, short, 1st about half eye-diameter, 2nd injured, 5th ray longest, about equal to 4th ray of dorsal. P 21–22. Caudal rounded-truncate. Scales about 60 between base of humeral spine and base of caudal ; each scale has a central tubercle with radiating ribs, which are often granulose ; towards caudal peduncle the scales become more or less distinctly arranged in transverse rows, and slightly imbricate on base of caudal ; scales present on base of pectoral, but absent from belly, which is corrugate and rugulose and probably distensible. Chin naked, the skin in front of the pelvic tubercles forming transverse, lobate, and lamellate folds. Distance of vent from opercle nearly equal to its distance from base of (median) caudal rays. Pyloric caeca 10. (Plate XVIII, fig. 6.)

Length.—330 mm.

Colour.—Grey below, slaty-blue above with round black spots which extend along the body and sides of head, soft dorsal and pectoral similarly spotted, caudal and anal greyish, a silvery sheen on opercle and lower jaw, pupil black with a narrow light ring round it, iris black.

Locality.—West coast, off Table Bay, probably about 200 fathoms.

Type in South African Museum.

The Museum is indebted to Mr. Austen of Cape Town for this interesting and unique specimen. He obtained it from one of the trawlers, but was unable to give the exact locality or depth at which the fish was caught.

Fam. 5. Trachinidae.

Weevers.

Body elongate, cylindrical, with very small cycloid scales arranged in oblique rows. Head moderate, not very broad, not armoured.

Eyes lateral, but high up and capable of being turned upwards. Mouth very oblique. Teeth villiform or cardiform on jaws, palatines, vomer, and sometimes pterygoids. Opercle moderate, with a strong spine. Subocular shelf well developed. Premaxilla protractile. Maxilla exposed, without supplemental bone. Gill-openings wide. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Dorsal elongate, with a few spines in front. Anal long, with 2 spines. Caudal free, truncate. Pectorals moderately broad, the lower rays simple. Ventrals jugular, close together, of 1 spine and 5 rays. Air-bladder absent. Pyloric caeca few. Lateral line single.

This family contains a single genus represented in the shallower waters of the Eastern Atlantic and Mediterranean. The record of a species from Chile is doubtful.

Weevers are usually found along sandy coasts. Though more active than the Stargazers, they spend most of their time buried in the sand. They are able to cause painful wounds with the dorsal and opercular spines. All these spines are grooved for the conveyance of the poison which is secreted in glands at their bases. The opercular glands are particularly large.

The eggs are pelagic.

The flesh of the Greater Weever is excellent, and these fishes are frequently brought to the Paris markets.

Gen. Trachinus Art.

1738. Artedi, Ichthyol., vol. ii, p. 74.

With the characters of the family.

**Trachinus draco* Linn.

The Greater Weever.

1758. Linné, Syst. Nat., ed. 10, p. 250.

1892. Smitt, Skand. Fish., vol. i, p. 128, pl. iv, fig. 3.

1907. Gill, Smiths. Misc. Coll., vol. xlviii, p. 413 (habits).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 142 (references).

1918. Fage, Dan. Ocean. Exp., vol. ii, A 3, p. 121 (post-larval stages).

Depth about 5, length of head a little over 4, in length of body.

Eye about 5 in length of head, 2–3 small spines above anterior angle of eye. Preorbital spine short, more or less obtuse. D VI(–VII) 28–32. A II 30–32. P 15–16, axil with a broad dermal scaleless flap. Scales in about 80 rows. Cheeks and opercles scaly. Pyloric caeca 6.

Length.—Up to 370 mm.

Colour.—Brownish with bluish oblique stripes and spots irregularly arranged on body and head, spinous dorsal black, soft dorsal and anal yellowish with pale bluish margin, caudal dusky.

Locality.—Cape seas.

Distribution.—West coast Europe, Mediterranean, west coast of Africa as far south as Guinea coast, Madeira.

This species is included here on the authority of Günther, who records (1860, Cat. Fish. Brit. Mus., vol. ii, p. 234) a large stuffed specimen from Cape seas presented by Sir Andrew Smith. So far as I am aware it has not been met with since either during the course of the Marine Survey or otherwise. There is a mark in the South African Museum copy of Günther's catalogue, in W. L. Sclater's handwriting, indicating that there was a specimen of this species in the Museum, but either the specimen has been destroyed or Sclater was mistaken in his identification, as there is no such fish in the Museum collections now.

T. araneus C. and V., a Mediterranean species, has been recorded from Mossamedes by Guimaraes (J. Sci. Math. Lisbon, vol. ix, 1882).

Fam. 6. Pinguipedidae.

Body elongate, cylindrical, with ctenoid scales. Head not armoured. Eyes lateral or subdorsal. Mouth moderate, nearly horizontal. Teeth in jaws villiform, with canines, teeth on vomer and usually on palatines. Premaxilla protractile. Maxilla concealed under preorbital. Opercle usually with 1 or 2 spines. No subocular shelf. Gill-membranes united, free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Dorsal elongate, with a few spines in front. Anal long, with 1(2) spine. Caudal free, rounded or truncate or forked. Pectorals without simple rays. Ventrals below or somewhat in advance of pectorals, of 1 spine and 5 rays. Air-bladder absent. Pyloric caeca few. Lateral line single, complete and continuous.

Small or moderate-sized fishes of tropical seas. Only one genus in South African waters.

Gen. Parapercis Blkr.

1863. Bleeker, Versl. k. Ak. Amsterd., vol. xvi, p. 361.

No palatine teeth. Middle 3rd and 4th dorsal spines highest, last spine conspicuously shorter than 1st ray, forming a notch.

This genus is confined to the Indo-Pacific region. Good eating, but usually caught only in small numbers.

Key to the South African species.

a. Flanks without ocelli . . . . . *nebulosa.*
b. Flanks with 3 or more yellow, black-centred ocelli . . *hexophthalma.*

Parapercis nebulosa (Q. and G.).

Sand-smelt.

? 1801. Bloch Schneider, Syst. Ichthyol., p. 179, pl. xxxviii (*maculata*).

1824. Quoy and Gaimard, Voy. Freyc. Poiss., p. 349.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 237.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 191.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 414.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 34.

Depth $6\frac{1}{4}$–$6\frac{1}{3}$, length of head $3\frac{1}{2}$–$3\frac{3}{4}$, in length of body. Eye $1\frac{2}{3}$–2 in snout, equal to or slightly greater than interorbital width, $4\frac{3}{4}$–$5\frac{3}{4}$ in length of head. Snout depressed. Lower jaws slightly projecting. Maxilla extending to below anterior margin of eye. Teeth in a single row on both jaws and on vomer, with canines in jaws. Margin of preopercle and opercle entire, or the former feebly crenulate. A moderately strong spine on opercle. D V 21–22, 3rd and 4th spines longest, 5th much shorter, equal to 1st. A I 17–18. P 15–16. Caudal rounded-truncate, the upper and lower rays in large specimens (? ♂) prolonged into filaments. Pyloric caeca 4. Scales : l.l. ca. 85 ; l.tr. $\frac{5\text{–}6}{20}$. Whole head, except snout, scaly.

Length.—Up to 260 mm.

Colour.—Greyish, with about 8 dark irregular cross-bands, indistinct dorsally, more distinct on lower side of a light or whitish band which runs from pectoral to middle of caudal, head mottled, a black spot on upper part of base of caudal, which is barred with darker spots, dorsal

light, indistinctly spotted, ventrals dusky. Günther says that the spinous dorsal is partly or completely black.

Locality.—Natal coast, down to 25 fathoms.

Distribution.—Indian seas to Australia.

Parapercis hexophthalma (C. and V.).

Ocellate Sand-smelt.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iii, p. 271.

1829. *Id., ibid.*, p. 272 (*polyophthalma*).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 239.

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xx, p. 816 (*polyophthalma*).

1878–88. Day, Fish. Ind., p. 263, pl. lvii, fig. 4.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 466.

Depth $5\frac{1}{2}$–$6\frac{1}{2}$, length of head $3\frac{2}{3}$–4, in length of body. Eye $1\frac{1}{2}$–2 in snout, equal to or rather less than interorbital width, $4\frac{1}{2}$–5 in length of head. Snout depressed. Lower jaw slightly projecting. Maxilla extending to below anterior margin of eye. Teeth in bands in jaws and on vomer, with canines in jaws. Margins of preopercle and opercle entire. Opercle with a short spine. D V 19–22, 3rd and 4th spines longest, 5th equal to 2nd. A I 17–18. P 17. Caudal rounded-truncate. Scales : l.l. 60–65 ; l.tr. $\frac{7}{18\text{–}19}$. Whole head except snout scaly. (Plate XIX, fig. 1.)

Length.—Up to 230 mm.

Colour.—Greyish, brownish, or greenish-yellow, with short, irregular dark vertical streaks and irregular, broken, longitudinal lateral stripes, belly yellowish, unspotted, 3–7 yellow, black-centred ocelli on lower part of side, spinous dorsal with a black spot in front, soft dorsal and anal mottled with yellow and with 2–3 rows of black dots, caudal barred with black dots and with a large black blotch at its base, pectorals and ventrals unspotted, head with dark brown or black oblique lines from eye across opercles. When there are more than 3 ocelli the streaks on head are broken up into dots.

Locality.—Mozambique, 1–3 fathoms.

Distribution.—Indo-Pacific region.

A closely allied species, *P. cancellata* (C. and V.), is also recorded from Mozambique by Playfair and Günther (Fish. Zanz., p. x).

Fam. 7. Opisthognathidae.

Body elongate, moderately compressed, with small cycloid scales. Head large, naked, not armoured. Eyes rather large, lateral but high up. Mouth large, horizontal. Maxilla long, broad, exposed, with supramaxillary bone. Premaxilla protractile. Teeth villiform or cardiform in jaws, sometimes also on vomer; none on palatines. Opercle unarmed. No subocular shelf or a very narrow one. Gill-openings very wide. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Dorsal long, continuous, the spinous and soft portions subequal. Anal with 2 weak spines. Caudal free, rounded or lanceolate. Pectorals moderately broad. Ventrals in advance of pectorals, close together, of a spine and 5 rays. Air-bladder present. No pyloric caeca. Lateral line single, high up, incomplete, ending about in middle of body.

Moderate-sized tropical fishes, often brightly coloured, usually frequenting rocky bottoms in shallow or moderately deep water.

The *Pseudochromididae*, once considered to be closely allied to this family, are now regarded as more or less closely related to the *Serranidae*. *Opisthognathus* is sometimes included in the *Pseudochromididae*, but Regan's opinion (1913) is here followed.

Gen. Opisthognathus Cuv.

1817. Cuvier, Règne Anim.

Dorsal spines normal, not transversely forked.

The genus *Gnathypops* Gill has been proposed for those species in which the maxilla is of moderate length. The different species, however, show gradations in the length of the maxilla, and as this is the only distinguishing feature, the subdivision of the original genus seems unjustified.

Key to the South African species.

1. Maxilla not extending to hind edge of preopercle (*Gnathypops*) *muscatensis.*
2. Maxilla extending nearly to pectoral (*Opisthognathus*) . . *nigromarginatus.*

Opisthognathus muscatensis Blgr.

1887. Boulenger, Proc. Zool. Soc., p. 662, pl. liv, fig. 1.
1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 3, p. 251.
1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 348.
1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 263.

Depth $4\frac{1}{3}$–$4\frac{2}{3}$, length of head 3–$3\frac{1}{2}$, in length of body. Eye nearly twice snout, a little greater than interorbital width, 4–$4\frac{1}{3}$ in length of head. Maxilla extending to about half-way between orbit and hind margin of opercle, or not quite so far, rounded posteriorly. Teeth in a fairly broad band near symphysis, with an outer row of enlarged teeth continued along posteriorly; no vomerine teeth. D 25–27, about 10 of them spinose. A 15–17. Caudal rounded. Lateral line ending below about the 15th dorsal ray. (Plate XIX, fig. 2.)

Length.—Up to 350 mm.

Colour.—Brown, marbled and spotted with darker, head speckled, upper and lower jaws bordered with blackish, chin also blackish, dorsal with dark blotches and stripes, a black, white-edged spot between 3rd–7th spines, anal with dark stripes and a blackish margin.

Locality.—Natal coast.

Distribution.—Muscat, Persian Gulf.

**Opisthognathus nigromarginatus* Rüpp.

1828. Rüppell, Atl. Fisch., p. 114, pl. xxviii, fig. 4.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 498 (*sonneratii*).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 254.

1866. Playfair and Günther, Fish. Zanz., p. 69.

1878–88. Day, Fish. Ind., p. 266, pl. lvii, fig. 5.

Depth $4\frac{3}{4}$, length of head $3\frac{1}{2}$, in length of body. Eye twice snout, 4 times interorbital width, 4 in length of head. Maxilla extending to base of pectoral fin, posteriorly bluntly pointed. Teeth as in *muscatensis*. D 24–26, about 14 spinose. A 15–18. Caudal rounded. Lateral line ending below middle of dorsal fin.

Length.—Up to 180 mm.

Colour.—Yellowish marbled with brown, margin of upper jaw black, dorsal spotted, with a black, white-edged spot between 4th–8th spines, anal with dark margin.

Locality.—Mozambique.

Distribution.—East coast of Africa, Indian seas.

Fam. 8. Callionymidae.

Dragonets.

Body elongate, cylindrical, depressed anteriorly, naked. Head broad and depressed. Eyes directed upwards. Mouth small.

protractile, horizontal. Lower jaw not prominent. Maxilla concealed, without supramaxillary bone. Teeth small, on jaws only, none on palate. Preopercle with a strong spine at the angle. Gill-openings very narrow. Gill-membranes broadly joined to isthmus. Gills 4, a slit behind 4th. Pseudobranchiae well developed. Two dorsal fins (occasionally united at base) ; spinous dorsal of 3–4 slender flexible spines. Soft dorsal and anal similar, the latter without distinct spine. Caudal free, more or less lanceolate. Pectorals small. Ventrals larger than, and in advance of, pectorals, of a spine and 5 rays. Air-bladder absent. Pyloric caeca absent. Lateral line present, often duplicated. Male with external papilliform prolongation of the genital tube.

Small fishes living in shallow and moderately deep water in temperate and tropical regions. They are noted for their strong sexual dimorphism. The males are differently coloured and have a higher dorsal fin than the females. Holt (1898, Proc. Zool. Soc., p. 281) has described the courtship and pairing. The eggs are pelagic. This is the only known case among the Bony Fishes where there is a definite sexual intercourse followed by the laying of pelagic eggs. As a rule where such intercourse occurs, the fishes are viviparous.

The South African fauna contains one species widely distributed from the West coast round as far as East London. From Natal two species are known, and one from Mozambique. It is probable that further species, identical with or allied to Indo-Pacific species, will be discovered in Natal. The South African Museum possesses two specimens which are different from any of the species described in this work, but they are too young to be identified with certainty.

Key to the South African genera.

1. Lateral line simple.
   a. Preopercular spine with recurved denticles . . . *Callionymus.*
   b. Preopercular spine simple . . . . . *Calliurichthys.*
2. Lateral line with transverse branches . . . . *Paracallionymus.*

Gen. Callionymus Linn.

1758. Linné, Syst. Nat., ed. 10, p. 249.

1918. Fage, Dan. Ocean. Exp., vol. ii, A 3, p. 126 (characters and post-larval stages).

Gill-opening reduced to a small foramen opening dorsally. Lateral line single, simple. Preopercular spine very large, hooked at tip,

with one or more recurved denticles above, and a small antrorse spine at its base (the latter often covered by the skin). Ventral fins entire, without detached outer ray. Caudal usually rounded, not very elongate.

This genus is nearly cosmopolitan.

Key to the South African species.

1. Male without dark cross-bands. Female with 1st dorsal uniform blackish. No spot at base of pectoral . . . . . *marleyi.*
2. Male with dark cross-band from 1st dorsal to pectoral. Female with bluish lines on 1st dorsal. A dark spot at base of pectoral . *marmoratus.*

Callionymus marleyi Regan.

Marley's Dragonet.

1918. Regan, Ann. Durban Mus., vol. ii, pt. 2, p. 77 (*cooperi* non Regan 1908).

1919. *Id., ibid.*, vol. ii, pt. 4, p. 201, fig. 4.

Length of head (to gill-opening) 4 in length of body. Eyes narrowly separated, equal to snout, $3\frac{1}{4}$ in length of head (to gill-opening). Premaxillary band of teeth produced backwards laterally. Preopercular spine nearly straight, with 3–5 denticles in addition to apical hook. Top of head behind eyes pitted. Gill-openings small, dorsal. D IV+9; spinous dorsal in ♂ not strongly elevated, tips of spines only slightly projecting beyond membrane, 1st and 4th longest, a little shorter than head; in ♀ 1st and 2nd longest, half length of head. A 9. Caudal rounded, not longer than head.

Length.—Up to 95 mm.

Colour.—Yellowish-grey with darker dots and rings, a lateral series of small dark spots, spinous dorsal in ♂ light with linear markings, in ♀ uniform blackish, soft dorsal with longitudinal series of dark dots, caudal spotted, usually a black spot larger than the others at end of lower rays.

Locality.—Natal coast.

Type in British Museum.

This species was at first confounded with *C. cooperi* from the Maldive Islands, but is distinguished by the less elevated spinous dorsal in ♂, and the backward extensions of the premaxillary band of teeth. It is possible, however, that fully adult males of *C. marleyi* have not yet been observed.

**Callionymus marmoratus* Pet.

Banded Dragonet.

1855. Peters, Wiegm. Archiv., p. 255.

1858. Bianconi, Spec. Zool. Mosamb., p. 263, Pisc., pl. ix (*perelegans*).

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 150.

Length of head about 4 in length of body. Eyes about half a diameter apart, subequal to snout, about 3½ in length of head. Preopercular spine somewhat curved, with 2 denticles. Gill-openings somewhat lateral. D IV+8–9 ; spinous dorsal in ♂ strongly elevated, tips of spines projecting far beyond membrane, 1st and 2nd longest, reaching base of caudal ; in ♀ not elevated. A 7–8. Caudal rounded, nearly half length of body.

Length.—Up to 130 mm.

Colour.—Brownish, spotted and variegated with blackish, ♂ with a broad black band from spinous dorsal to pectoral, spinous dorsal in ♂ brownish with pearly or bluish oblique vermiculate lines, a violet spot near margin of membrane between 2nd and 3rd, and another between 3rd and 4th spines, in ♀ brown with interrupted bluish lines, soft dorsal and caudal with rows of spots, pectoral with a semicircular dark spot at base.

Locality.—Mozambique.

Distribution.—East coast of Africa.

Gen. Calliurichthys J. & F.

1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, p. 941.

Gill-opening reduced to a small foramen opening dorsally. Lateral line single, simple. Preopercular spine long, simple, pointed, sometimes serrulate but without recurved denticles. Ventral fins without detached rays. Caudal usually very elongate, lanceolate, more so in male than female.

An Indo-Pacific genus, which is not well differentiated from *Callionymus*.

Calliurichthys gardineri Regan.

Long-tailed Dragonet.

1908. Regan, Tr. Linn. Soc., 2nd ser. Zool., vol. xii, pt. 3, p. 248, pl. xxx, fig. 5.

Length of head (to gill-opening) 4 in length of body. Eyes contiguous, slightly less than snout, 3½ in length of head. Top of head

with a group of granular tubercles behind each eye, with a smaller median group of 2 granules behind. Snout quite smooth. Maxilla not extending to below anterior margin of eye. Preopercular spine as long as eye, slightly curved, sharply pointed, with 4–5 small serrations on its inner edge, and an antrorse spine at its base. Gill-openings dorsal, their width apart slightly greater than length of snout. D IV+9 ; spinous dorsal not elevated, tips of spines not projecting far beyond membrane, 1st spine longest, almost equal to length of head, last soft ray reaching to base of caudal. A 8. Caudal lanceolate, $2\frac{1}{2}$ times length of head.

Length.—Up to 220 mm.

Colour (as preserved).—Pale, a dark spot near upper margin of membrane, between 3rd and 4th dorsal spines, anal with a dark margin.

Locality.—Natal coast, 20 fathoms.

Distribution.—Indian Ocean.

A single specimen, 115 mm. in length, which is described above, has been provisionally identified with Regan's species. With almost equal justice, it might have been assigned to the closely allied *maldivensis*. The specimen appears to be a young ♂, without the filamentous prolongation of the 1st dorsal spine. There is no dark patch on throat. More material of both sexes is required to make the identification certain.

Paracallionymus n. g.

Gill-opening reduced to a small foramen opening dorsally. Lateral line single, with lateral transverse branches, those above being longer than those below the line. Preopercular spine short, simple, sharply pointed, without any denticles or serrations and without antrorse spine at its base. Ventral fins without detached rays. Caudal lanceolate, moderately long.

The institution of a new genus for the single South African species is justified in view of the unique development of the lateral mucous system. The preopercular spine is also different from that in the other genera.

Paracallionymus costatus (Blgr.).

Cape Dragonet.

1898. Boulenger, Mar. Invest. S. Afr., vol. i, p. 9 (juv. ♀).
1918. Thompson, Mar. Biol. Rep., vol. iv., p. 143.

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 21.

Length of head $3\frac{3}{4}$–$3\frac{4}{5}$ in length of body. Eyes narrowly separated, equal to snout, 3 in length of head. Maxilla extending to below anterior margin of eye. Preopercular spine $\frac{1}{3}$ diameter of eye, curved, unicuspid. Snout and top of head smooth. D IV+9–10, the two fins contiguous at base in ♂, well separated in ♀; spinous dorsal in ♂ elevated, tips of spines produced as filaments far beyond membrane, 2nd and 3rd spines longest, reaching base of caudal, 1st $\frac{3}{4}$ length of 2nd, 4th $\frac{1}{2}$ length of 1st and slightly longer than head; in ♀ low, 1st spine longest, nearly $\frac{1}{2}$ length of head, other spines graduated; last soft ray in ♂ reaching base of caudal. A 9. Caudal lanceolate, in ♀ as long as distance from tip of snout to base of pectoral, in ♂ half as long again. Lateral line with 33–35 branches above, and 25–29 below; each superior branch has very short accessory projections posteriorly, each of which ends in a pore; each inferior branch opens directly by a pore at its lower end. (Plate XIX, fig. 3.)

Length.—Up to 150 mm. (♂ and ♀).

Colour (as preserved).—Brownish or greyish, speckled with darker dots and irregular spots, the latter mainly along the sides, above and below the lateral line; spinous and soft dorsals in ♂ pale, spinous dorsal in ♀ black with white stripe along 2nd dorsal spine, soft dorsal with narrow black margin; anal in both sexes light with dark margin, tips of rays white, caudal unspotted, inner ventral rays dusky.

Locality.—West coast (off St. Helena Bay, Saldanha Bay, Table Bay), off Cape Point, False Bay, and Agulhas Bank to East London, 30–250 fathoms.

Type (juv.) in British Museum; cotype (juv.) and plesiotypes of adult ♂ and ♀ in South African Museum.

Fam. 9. Cirrhitidae.

1911. Regan, Ann. Mag. Nat. Hist., (8), vol. vii, p. 260 (definition).

Body compressed, oblong, with moderate-sized cycloid or ctenoid scales. Eyes lateral, moderate. Mouth small, terminal, protractile. Maxilla narrow, not concealed, without supramaxilla. Teeth conical or villiform, on jaws and on vomer, sometimes present on palatines. Preopercle entire or serrate. Gill-membranes united, free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. One dorsal fin, spinous portion well developed, with 10 spines and 11–14 rays. Three anal spines. Caudal free, rounded or subtruncate.

Pectorals with the lower 5–8 rays simple. Ventrals well behind base of pectoral, of a spine and 5 rays. Air-bladder large and complicated. Pyloric caeca few. Lateral line complete and continuous.

Carnivorous fishes from the coastal waters of the Indo-Pacific region.

Key to the South African genera.

1. No teeth on palatine . . . . . *Paracirrhites.*
2. Teeth on palatine.
   a. Profile of head convex . . . . . *Cirrhitus.*
   b. Profile of head incurved at nape . . . . . *Cirrhitichthys.*

Gen. Paracirrhites Blkr.

1875. Bleeker, Verh. k. Ak. Wet., vol. xv, p. 5.

Snout not produced. Profile of head convex. Some of the teeth on jaws canine-like ; no teeth on palatines. Scales on body and head rather large, cycloid. Pectoral fins not extending back as far as ventrals.

If *P. cinctus* Gnthr. (=*fasciatus* Benn.) should prove to belong properly to this genus, the name will have to be changed to the earlier *Amblycirrhitus* Gill 1862.

Key to the South African species.

1. Head spotted ; a broad black stripe on posterior half of body . *forsteri.*
2. Head not spotted, but with a large ocellus enclosing the eye . . *arcatus.*

**Paracirrhites forsteri* (Bl. Schn.).

1801. Bloch Schneider, Syst. Ichth., p. 191.

1874. Günther, Fische d. Südsee, p. 69, pl. xlix, fig. A.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 143, pl. cccxlix, fig. 5.

1878–88. Day, Fish. Ind., p. 144, pl. xxxv, fig. 4.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 450, pl. lxvii.

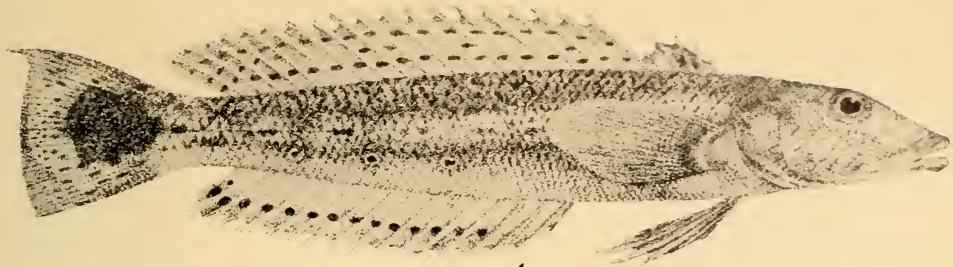
1916. Thompson, Mar. Biol. Rep., vol. iii, p. 133 (references).

Depth $2\frac{3}{4}$, length of head 3, in length of body. Eye twice in snout, 6 in length of head. Anterior nostril with a large fringed flap. D X 11. A III 6. Simple pectoral rays 7. Scales : l.l. 48–50 ; l.tr. $\frac{5-6}{10-13}$. Five series on cheek.

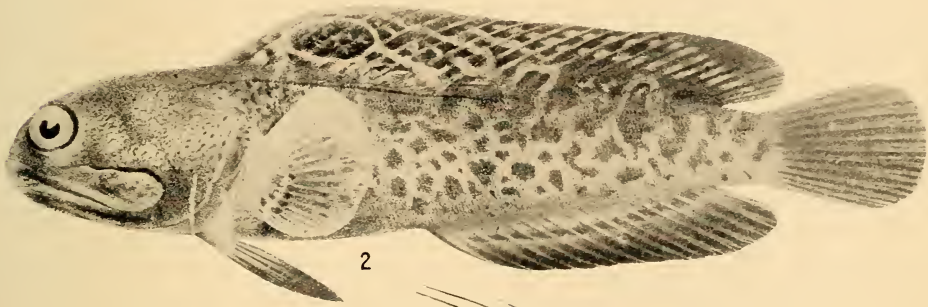
Length.—Up to 450 mm.

PLATE XIX.

FIG.		TEXT-PAGE
1.	*Parapercis hexophthalma* (C. and V.) (after Day)	442
2.	*Opisthognathus muscatensis* Blgr. (after Boulenger)	443
3.	*Paracallionymus costatus* (Blgr.) ♂, with portion of lateral line enlarged (original)	448
4.	*Cirrhitus marmoratus* (Lac.) (after Bleeker)	452



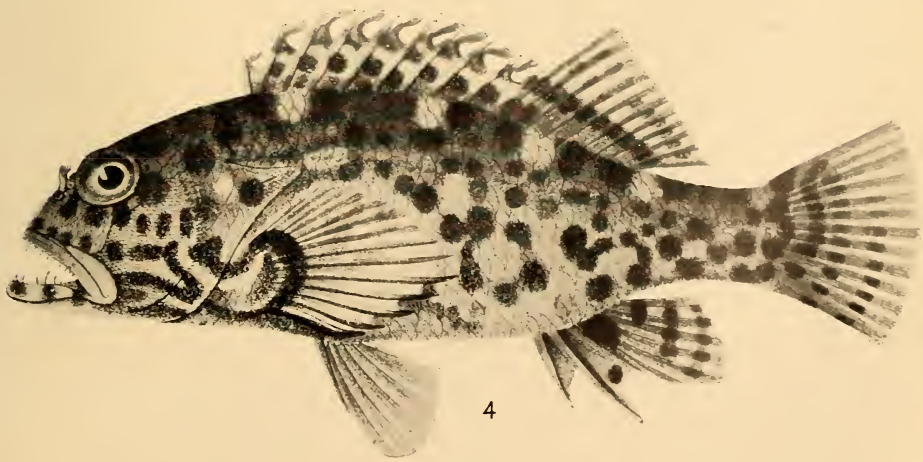
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2



3



4

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Colour.—Reddish or olivaceous, a broad black stripe along posterior half of body, a whitish or yellowish band from base of pectoral to caudal, with several alternate yellowish and bluish stripes below; head, throat, chest, and base of pectoral with red and black spots; outer margin of spinous dorsal dusky, membrane of soft dorsal and anal dusky.

Locality.—Cape seas.

Distribution.—East coast of Africa, Indian seas, East Indies, Pacific Ocean.

The only record of this species in South African waters is a stuffed specimen in the British Museum presented by Sir Andrew Smith, though there is every probability of its being found within our area.

**Paracirrhites arcatus* (C. and V.).

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iii, p. 74.

1848. Richardson, Voy. Samarang. Fish., p. 26, pl. v, figs. 3–5.

1874. Günther, Fische d. Südsee, p. 70, pl. xlix, figs. B, C.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 144, pl. cccliii, fig. 3.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 450, pl. lxix.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 133 (references).

Depth $2\frac{1}{3}$–$2\frac{1}{2}$, length of head 3, in length of body. Eye $1\frac{1}{2}$ in snout, $5\frac{1}{2}$ in length of head. Anterior nostril with fringed flap. D X 11. A III 6. Simple pectoral rays 7. Scales: l.l. 50; l.tr. $\frac{5\text{–}6}{11\text{–}12}$; 6–7 series on cheek.

Length.—Up to 140 mm.

Colour.—Olivaceous or brownish, with longitudinal reddish or brownish lines, a broad white or pinkish stripe on posterior half of body; an oval orange or scarlet ocellus enclosing and extending behind eye, sometimes bluish or greenish within; 3 orange bars with bluish intervening spaces across lower angle of opercle.

Locality.—Cape of Good Hope.

Distribution.—Mauritius, East Indies, Pacific Ocean.

The inclusion of this species in the fauna-list rests on Richardson's statement. There is, however, considerable doubt whether the locality given by Richardson is correct, as it is known that Captain Belcher, the commander of H.M.S. *Samarang*, relied to a large extent on his memory instead of labelling his specimens (see Tomlin, Ann. S. Afr. Mus., vol. xx, pt. 4, p. 310, 1925).

Gen. CIRRHITUS Lac.

1803. Lacépède, Hist. Nat. Poiss, vol. v, p. 3.

(This name was altered to *Cirrhites* by Cuvier and Valenciennes, and accepted by most later writers.)

Snout not produced. Profile of head convex. Some of the teeth on jaws canine-like; teeth present on palatines. Scales cycloid, those on body rather large, those on head small. Pectoral fins not extending back as far as ventrals.

Cirrhitus marmoratus (Lac.).

1801. Lacépède, Hist. Nat. Poiss., vol. iii, p. 492, pl. v, fig. 3.

1803. *Id., ibid.*, vol. v, p. 3 (*maculatus*).

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 142, pl. cccxliv, fig. 5.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 452, pl. lxx.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 347 (references).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321 (*maculatus*).

Depth $2\frac{3}{4}$–3, length of head 3, in length of body. Eye twice in snout, $5\frac{1}{2}$–$5\frac{3}{4}$ in length of head, equal to interorbital width. Anterior nostril with fringed flap. Hind margin of preopercle finely denticulate. D X 11. A III 6. Simple pectoral rays 7. Scales: l.l. 40–42; l.tr. $\frac{4\text{–}5}{9\text{–}11}$. (Plate XIX, fig. 4.)

Length.—Up to 250 mm.

Colour.—Body blotched and marbled with bluish, white, olivaceous, and brownish, the white often forming 5 irregular cross-bars; head either yellowish with dark irregular bands, or bluish with yellowish-brown irregular bands; spinous dorsal, base of soft dorsal, anal, and caudal with reddish or brownish spots.

Locality.—Natal coast.

Distribution.—East coast of Africa, Indian seas, East Indies, Pacific Ocean.

This species is common among coral reefs and along rocky coasts, and is a good food-fish.

Gen. CIRRHITICHTHYS Blkr.

1856. Bleeker, Natur. Tydsskr. Ned. Ind., vol. x, p. 474.

Snout somewhat pointed, but not strongly produced. Profile of head more or less strongly incurved on nape. Canine teeth few or

none ; teeth on palatines. Scales cycloid (or feebly ctenoid), rather large on body and head. Pectoral fins extending back beyond ventrals. First dorsal soft ray often elongated.

Key to the South African species.

1. Depth $2\frac{1}{2}$ in length of body . . . . . *aprinus.*
2. Depth $3\frac{1}{4}$ in length of body . . . . . *oxycephalus.*

Cirrhitichthys aprinus (C. and V.).

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iii, p. 76.

1853. Bleeker, Natur. Tydsskr. Ned. Ind., vol. iv, p. 106 (*graphidopterus*).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, pp. 73, 74.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 146, pl. cccliii, fig. 1.

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.

Depth $2\frac{1}{2}$–$2\frac{2}{3}$, length of head 3, in length of body. Eye $1\frac{1}{3}$ in snout, 4–$4\frac{1}{4}$ in length of head, slightly greater than interorbital width. Anterior nostril with fringed flap. Hind margin of preopercle strongly denticulate. Preorbital denticulate posteriorly (but frequently entire in South African specimens). D X 12, 1st soft ray elongated (in adult). A III 6. Simple pectoral rays 6. Scales : l.l. 38–42 ; l.tr. $\frac{4}{11\text{–}12}$. Four series on cheek.

Length.—Up to 90 mm.

Colour.—Rose or reddish, with 5–6 irregular dark brown or blackish cross-bars, which are frequently broken up into series of round or irregularly shaped spots ; head and dorsal and caudal fins also spotted.

Locality.—Natal coast.

Distribution.—East Indies.

**Cirrhitichthys oxycephalus* Blkr.

1856. Bleeker, Natur. Tydsskr. Ned. Ind., vol. x, p. 474.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 75.

1874. *Id.*, Fische d. Südsee, p. 71.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 147, pl. ccccliii, fig. 1.

Depth $3\frac{1}{4}$, length of head $3\frac{1}{3}$, in length of body. Eye slightly greater than snout, $3\frac{1}{2}$ in length of head. Anterior nostril with fringed flap. Hind margin of preopercle strongly denticulate. Preorbital not

denticulate. D X 12, 1st soft ray (in adult) elongated. A III 6. Simple pectoral rays 6. Scales : l.l. 40 ; l.tr. $\frac{4}{10-11}$.

Length.—Up to 90 mm.

Colour.—Rosy, with 5 irregular dusky and interrupted cross-bands, extending on to base of dorsal fin.

Locality.—Durban (=Port Natal, Günther).

Distribution.—East Indies, Marshall Islands.

Fam. 10. Chilodactylidae.

1911. Regan, Ann. Mag. Nat. Hist., (8), vol. vii, p. 261 (definition).

Body compressed, oblong, with moderate-sized cycloid scales. Eyes lateral. Mouth small, terminal, protractile. Lips thick and fleshy. Maxilla not concealed, without supramaxilla. Teeth villiform on jaws, none on vomer or palatine. Preopercle entire. Gill-membranes united, free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. One dorsal fin, spinous portion well developed, with 16–19 spines and 23–33 rays. Three anal spines. Caudal free, forked. Pectorals with the lower 5–7 rays simple. Ventrals well behind base of pectoral. Air-bladder large, with many lobes. Pyloric caeca few. Lateral line complete and continuous.

Carnivorous fishes inhabiting South Africa, Tristan d'Acunha, South America, St. Paul Island, and the tropical parts of the Pacific, extending to Japan, China, and Australasia.

The eggs and spawning habits are unknown. As regards the young stages, the discovery of a very interesting young specimen has enabled me to assign to their true systematic position certain small fishes which Günther believed were the young of *Evistius huttoni* (*Platystethus huttoni* Gnthr., 1889, Challeng. Rep., vol. xxxi, p. 13, pl. ii, fig. 4). Günther had three specimens, one from Australian seas, one from the southern Indian Ocean between Australia and the Cape, and one from 34° S. 12° E., which he thought might well be the young of three distinct species. In this he was probably right, but they are certainly not species of "*Platystethus*." Günther would have recognised this himself if his specimens had not apparently had all the scales rubbed off, as *Evistius huttoni* has 90 scales in the lateral line.

The proof that these small fishes are the young of Chilodactylids is afforded by a specimen 58 mm. long of *P. grandis*, which combines the characters of the very young with those of the adult (*vide infra*).

Another interesting specimen is a young *C. fasciatus*, 50 mm. long (*vide infra*), and thus smaller than the specimen of *P. grandis*, but in a more advanced stage.

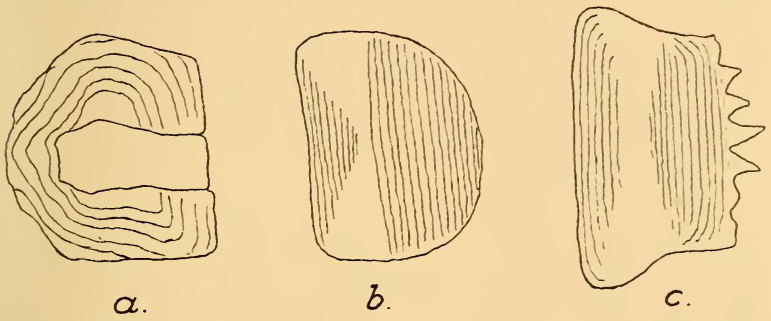


Fig. 19.—*a*, lateral line scale, and *b*, ordinary scale of young *Palunolepis brachydactylus*; *c*, scale of young *Chilodactylus fasciatus*. In all the figures the posterior margin is to the right.

Key to the South African genera.

1. Scales small; 6 series in sheath along base of dorsal fin . *Chilodactylus.*
2. Scales moderate; 1–2 series in sheath . . . . . *Palunolepis.*

Gen. Chilodactylus Lac.

1803. Lacépède, Hist. Nat. Poiss, vol. v, p. 5.

Anterior profile not steeply inclined. Head scaly, without tubercles. Breast and belly rounded in adult. Scales rather small, concentrically striate; those on cheeks, opercles, and breast considerably smaller, feebly developed, more or less papilliform. Six rows of small scales forming the sheath along base of dorsal fin; 3–4 rows forming sheath along anal. No naked groove between sheath and body scales. Dorsal spines evenly graduated. Anal short, spines not very strong, anterior rays considerably longer than the posterior ones.

The type species of this genus is *C. fasciatus*. The genus is thus peculiar to South Africa, the other species being assigned to allied genera.

Chilodactylus fasciatus Lac.

Banded Steenklip-vis or *Steenvis.*

1801. Lacépède, Hist. Nat. Poiss., vol. v, p. 6, pl. i.
1862. Castelnau, Mem. Poiss. d'Afr. Austr., p. 12 (*multiradiatus*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 79 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 249.

Depth about equal to length of head, 3–3¼ in length of body. Eye equal to or less than interorbital width, 1¾ in snout, 4¾–5 in length of head. Anterior nostril with 2 fringed flaps. Maxilla extending to below posterior nostril. D XVIII–XIX 23–24, spines graduated up to about 10th, which is 3½ in length of head. A III 9. Simple pectoral rays 5, the 2nd longest, reaching nearly or quite to vent. Gill-rakers 13 on lower part of anterior arch. Scales : l.l. (75)80–85.

Length.—Up to 350 mm.

Colour.—Brownish or rusty, irregularly marbled with darker, the marbling usually forming 4–5 cross-bands extending on to base of dorsal, the portions above the lateral line more or less alternating with the portions below ; soft dorsal with a few spots, caudal with several oblique cross-bars, lips and the simple pectoral rays pinkish or orange.

Locality.—Table Bay, False Bay to Algoa Bay and East London, down to 40 fathoms.

This fish is not uncommon near rocky ground, and is a good food-fish.

C. multiradiatus Cast. is merely a colour variation.

A young specimen 50 mm. long shows all the characters of the adult, but is more compressed in the thoracic and abdominal regions and has a sharp ridge along the chest and belly ; and the scales are vertically striate with jagged free margin (text-fig. 19 *c*). It was caught off Great Fish Point (near Port Alfred) in 30 fathoms on 30th August.

Palunolepis n. g.

Anterior profile not steeply inclined. Head scaly, without tubercles. Breast and belly rounded in adult. Scales moderately large, rough and granulose in centre with a smooth margin ; those on cheeks, opercles, and middle line of breast smaller, well developed, not papilliform. Sheath along base of dorsal fin composed anteriorly of 1 row, posteriorly of 2 rows, of scales ; sheath along anal of 1 row. A naked groove between the sheath and the body scales. Dorsal spines evenly graduated. Anal short, spines not very strong, anterior rays considerably longer than the posterior ones.

The fretted appearance (as if sand-blasted) of the scales and the naked groove below the dorsal sheath are very distinctive features which appear to be absent in all the other genera of this family.

Key to the South African species.

1. Soft dorsal rays 22–23 . . . . . *grandis.*
2. Soft dorsal rays 29–31 . . . . . *brachydactylus.*

Palunolepis grandis (Gnthr.).

Greater Steenklip-vis.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 79.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 80.

Depth about equal to length of head, $2\frac{4}{5}$–$3\frac{1}{4}$ in length of body. Eye equal to (juv.) or less than interorbital width, twice or a little less (juv.) in snout, 4 (juv.)–5 in length of head. Anterior nostril with 2 fringed flaps. Maxilla extending to below nostrils. D XVII–XVIII 22–23, spines graduated to 5th spine, which is $\frac{1}{3}$ length of head. A III 9. Simple pectoral rays 6, 2nd longest, reaching to or beyond vent. Gill-rakers 12–13 on lower part of anterior arch. Scales : l.l. 50–53. (Plate XX, fig. 1.)

Length.—Up to 950 mm.

Colour.—Uniform grey or brown, the naked groove below dorsal sheath darker.

Locality.—False Bay and Agulhas Bank, down to 40 fathoms.

Type in British Museum.

This fish is but rarely caught by the trawlers as its habitat is near rocky ground. Nor is it often caught by rod and line. It is excellent eating.

A young specimen, 58 mm. long, resembles in shape Günther's figure (see under *brachydactylus*) ; the body is compressed and the prominent breast and belly are cultrate. Dorsal and anal fin sheaths and the naked dorsal groove distinct. The scales still show the vertical striation, but some show traces of the characteristic surface sculpturing ; the anterior margin is becoming lobulate, the posterior free margin entire, not serrate as in *C. fasciatus* (*supra*). The colour appears to have been silvery, dark brown on back, with 3 dark patches on the spinous dorsal, similar to the smaller specimens assigned to *brachydactylus* (*infra*). D XVII 22. A III 9. Lower pectoral rays just becoming thickened and prolonged. This specimen was caught in a rock-pool at Kalk Bay (False Bay) on 26th June.

Palunolepis brachydactylus (C. & V.).

Lesser Steenklip-vis.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 361.

1889. Günther, Challenger Rep., vol. xxxi, p. 14, pl. ii, fig. I (young ; *Platystethus huttoni* part).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 79 (references).

1921. Regan, Ann. Mag. Nat. Hist., (9), vol. vii, p. 416 (*Chilodactylus brevispinis*).

1922. Norman, *ibid.*, (9), vol. ix, p. 321.

Differs from *grandis* only in having 29–31 soft dorsal rays, and the longest pectoral ray never reaching beyond the vent.

Length.—Up to 370 mm.

Colour.—Greyish or brownish, with 6–7 whitish spots along the sides, which disappear rapidly when preserved ; lips and lower pectoral rays pinkish.

Locality.—Table Bay, False Bay and Agulhas Bank to East London and Natal.

Type of *brevispinis* in British Museum.

I have examined a series of all ages from 90 mm. upwards of both *grandis* and *brachydactylus* and find no other differences than those given above. The latter species does not grow to such a large size as *grandis*. *Chilodactylus brevispinis* does not appear to differ in any way from *brachydactylus*.

A number of young specimens, 15–35 mm. in length, were caught in surface tow-nettings off Cape Point (E. by N. 45 miles) on 19th August, together with *Myctophum coccoi*. They agree exactly with Günther's figure. D XVIII 27–30. A III 9–10. Scales with closely set vertical striae, anterior margin straight, lateral line tubes straight, wide, simple (text-fig. 19 *a*, *b*). A brown stripe along upper part of back and head, rest of head and body silvery, 3 black patches on spinous dorsal.

Fam. 11. Serranidae.

Sea Bass ; Rock-cod.

Body oblong, with moderate or small scales, usually ctenoid. Mouth moderate or large, not very oblique, protractile. Maxilla usually not entirely concealed, with or without a supplemental bone (supramaxilla). Second suborbital with an internal lamina or shelf supporting the eye. Teeth villiform or cardiform in jaws and usually

on palate. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. A single dorsal fin, often deeply notched, the spinous portion usually well developed. Anal spines either 3, or wanting altogether (1 weak spine in *Owstonia*). Ventrals thoracic, of a spine and 5 rays, without axillary process. Air-bladder present. Pyloric caeca numerous or few (absent in *Pseudochromis*). Lateral line single or double.

One of the largest families of fishes. Carnivorous, mostly marine, and nearly cosmopolitan. Very few species descend to great depths. Some of the Rock-cods grow to a very large size, some species of *Epinephelus* reaching a length of 10 or 12 feet.

Key to the South African genera.

I. Lateral line single.
  A. Anal with 3 well-developed spines.
    1. Without supplementary bone on maxilla.
      a. Dorsal fin not notched.
        i. Lateral line not close to base of dorsal fin.
          α. Gill-rakers short, far apart . . . *Serranus*.
          β. Gill-rakers long, close set . . . *Anthias*.
        ii. Lateral line along base of dorsal fin . *Callanthias*.
      b. Dorsal fin notched . . . . . *Therapon*.
    2. With supplementary bone on maxilla.
      a. Inner teeth depressible.
        i. Dorsal spines 6–8. Anal spines feeble . *Plectropoma*.
        ii. Dorsal spines 9–11. Anal spines strong *Epinephelus*.
      b. Inner teeth not depressible.
        i. Strongly compressed. Head naked and rugose above *Aulacocephalus*.
        ii. Not strongly compressed.
          α. Opercle with strong horizontal ridge . *Polyprion*.
          β. Opercle without ridge.
            * Anterior nostrils fringed . *Acanthistius*.
            ** Nostrils not fringed . . . *Dinoperca*.
  B. Anal without spines.
    1. D II–IV 23–25 . . . . . *Rhypticus*.
    2. D VI–VII 13–15 . . . . . *Grammistes*.
  C. Anal with 1, dorsal with 3 feeble spines . . . . *Owstonia*.
II. Lateral line double (interrupted) . . . . . *Pseudochromis*.

Gen. Serranus Cuv.

1817. Cuvier, Règne Anim., vol. ii, p. 276.
1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 274.
1918. Fage, Dan. Ocean. Exp., vol. ii, A 3, p. 26 (post-larval stages).

1926. Opinion 93, Intern. Comm. Nomencl., Smiths. Misc. Coll., vol. lxxiii, p. 9.

Scales ctenoid. Maxilla exposed, without supplemental bone. Teeth villiform in jaws, usually with more or less enlarged canines; teeth on vomer and palatines, none on tongue. Preopercle serrated. Gill-rakers not very elongate, usually slender and far apart. Spinous and soft portions of dorsal subequal, not divided by a notch. Anal with 3 spines. Caudal truncate or emarginate. Lateral line single, not close to dorsal profile.

Coasts of Europe, Africa, America; islands of St. Helena and St. Paul.

Some of the species are normally hermaphrodite (e.g. *cabrilla* and *hepatus*), whereas others are unisexual (e.g. *novemcinctus*).

In the Cat. Fish. Brit. Mus., vol. i, 1859, Günther gives Cape of Good Hope as a locality for *S. hepatus*, but in the 2nd ed., 1895, Boulenger does not admit this. Nor does Boulenger record *S. cabrilla* from South Africa. These two species are therefore not admitted here to the South African fauna-list.

Key to the South African species.

1. Gill-rakers 21–22 . . . . . *novemcinctus.*
2. Gill-rakers 11 . . . . . *knysnaensis.*

**Serranus novemcinctus* (Kner).

1865. Kner, " Novara " Fische, p. 17, pl. ii, fig. 1.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 124 (references).

Depth 3–3½, length of head 3–3⅕, in length of body. Eye 4–5½, interorbital width 5½, in length of head. Lower jaw projecting, with strong canine teeth. Maxilla reaching to below centre or posterior third of eye. Preopercle with serrations obsolete on lower margin. Middle opercular spine largest. Gill-rakers long, 21–22 on lower part of anterior arch. D X 14, 1st and 2nd dorsal spines shortest, the others not very unequal. A III 7, 1st and 2nd anal spines equal. Caudal feebly emarginate. Scales 85–90; lateral line 65–77; l.tr. $\frac{6\text{–}7}{22\text{–}25}$.

Length.—Up to 170 mm.

Colour.—Brown, with 9–10 darker cross-bands.

Locality.—Cape Town.

Distribution.—St. Paul Island, Indian Ocean.

Some of the localities in the account of the fishes of the " Novara " appear to be somewhat doubtful, and it may be that this species has been erroneously included in the South African fauna-list.

Serranus knysnaensis Gilch.

1904. Gilchrist, Mar. Invest. S. Afr., vol. iii, p. 2, pl. xix.

1916. Thompson, Mar. Biol. Rep, vol. iii, p. 124.

Depth $3\frac{1}{3}$, length of head 3, in length of body. Eye very slightly greater than interorbital width, $4\frac{1}{4}$ in length of head. Lower jaw projecting, with strong canine teeth. Maxilla reaching to below centre of eye. Preopercle with moderate serrations on lower margin. Middle opercular spine largest. Gill-rakers long, 11 on lower part of anterior arch. D X 13, 1st and 2nd dorsal spines shortest, the others not very unequal. A III 7, 1st anal spine shortest. Scales 83, those on opercle smaller than those on body; lateral line 72; l.tr. $\frac{8}{28}$.

Length.—175 mm.

Colour.—Dark brown, apparently uniform.

Locality.—Knysna.

Type in South African Museum.

This seems to be a rare fish, as no further records have been published, and the type still remains unique in the Museum collections.

Gen. Anthias Bl.

1792. Bloch, Ausl. Fische, vol. vi, p. 97.

1895. Boulenger, Cat. Fish. Brit. Mus., vol. i, ed. 2, p. 320.

1910. Jordan and Richardson, Proc. U.S. Nat. Mus., vol. xxxvii, p. 469 (*Sacura* subgenus).

1911. McCulloch, Sci. Res. " Endeavour," vol. i, p. 50.

1918. Fage, Dan. Ocean. Exp., vol. ii, A 3, p. 31 (post-larval stages).

Scales ctenoid. Maxilla exposed, without supplemental bone. Teeth villiform in jaws, with canines; teeth on vomer, palatines, and sometimes on tongue. Preopercle serrated. Gill-rakers long, slender, and close together. Spinous and soft portions of dorsal subequal, not divided by a notch. Anal with 3 spines. Dorsal and anal more or less scaly. Caudal emarginate. Lateral line single, rather high, but not close to base of dorsal fin, curved or forming an angle below hinder dorsal rays.

Jordan and Thompson (1914, Mem. Carn. Mus., vol. vi, pt. 4, p. 251) have instituted the genus *Franzia* for *Anthias nobilis* and other species in which the spinous as well as the soft portion of the dorsal fin is scaly.

If this genus is accepted, *Anthias squamipinnis* should be transferred to it.

Small brightly coloured fishes from tropical and subtropical seas.

Key to the South African species.

1. Third dorsal ray not produced.
   - *a.* Lateral line 40–44.
     - i. Without longitudinal stripes . . . . *squamipinnis.*
     - ii. With longitudinal stripes . . . . . *manadensis.*
   - *b.* Lateral line 37 . . . . . *huchtii.*
2. Third dorsal ray produced as a filament (*Sacura*) . . . . *natalensis.*

Anthias squamipinnis (Peters).

1855. Peters, M. B. Ak. Wiss. Berlin, p. 429.

1873–76. Bleeker, Atl. Ichthyol., vol. vii, pp. 18, 19, pl. cclxxxviii, figs. 1, 4 (*chirospilus* and *lepidolepis*).

1891. Sauvage, Hist. Madagasc. Poiss., p. 133, pl. xvii, fig. 1.

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 329 (references).

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 458.

Depth $2\frac{2}{3}$–3, length of head $3\frac{1}{2}$, in length of body. Eye slightly greater than snout, 3–$3\frac{1}{2}$ in length of head. Serrae of preopercle slightly enlarged at angle, which is rounded. Tongue smooth. D X 17–18, 1st and 2nd spines shortest, 3rd longest and sometimes produced in a long filament. A III 7–8, 1st shortest, 2nd about as long as but stronger than 3rd. Soft dorsal and anal pointed behind. Caudal emarginate, outer rays more or less filamentous. Scales present on snout, interorbital and maxilla, spinous and soft dorsal and anal; l.l. 40–44; l.tr. $\frac{2\text{–}3}{15\text{–}17}$. Gill-rakers 26, on lower part of anterior arch.

Length.—Up to 100 mm.

Colour.—Red or rosy, a broad bluish or violet stripe from eye to base of pectoral; spinous dorsal, caudal, and outer half of ventral rosy; inner half of ventral violet, pectoral with red blotches, soft dorsal and anal violet, with rosy spots, upper part of iris violet.

Locality.—Natal coast.

Distribution.—East coast of Africa, East Indies.

The elongation of the 3rd dorsal spine may possibly be a characteristic of adult males; Sauvage (*loc. cit.* p. 134) considers that it is not a specific character.

Anthias manadensis Blkr.

1856. Bleeker, Act. Soc. Sc. Ind. Neerl., vol. i, No. 6, p. 39.

1873–76. *Id.*, Atl. Ichthyol., vol. vii, p. 19, pl. cclxxxviii, fig. 5.

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 329.

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 458.

Similar to *squamipinnis*, but 3rd dorsal spine not longer than 4th, soft dorsal and anal rounded behind.

Colour.—Red or rosy above, golden on sides, with rose-coloured longitudinal stripes, fins yellow or orange with white (or blue) edge, soft dorsal dotted with yellow.

Locality.—Natal coast.

Distribution.—East Indies.

It seems not unlikely that this form may prove to be the female of *squamipinnis*.

There is a specimen from Natal in the South African Museum which is indistinguishable from *squamipinnis* morphologically, but which differs slightly in coloration. It is orange, without stripes, with a *narrow* violet streak from eye to base of pectoral, fins pale yellowish, soft dorsal dotted with orange.

**Anthias huchtii* Blkr.

1857. Bleeker, Act. Soc. Sc. Ind. Neerl., vol. ii, p. 38.

1873–76. *Id.*, Atl. Ichthyol., vol. vii, p. 17, pl. ccxc, fig. 1.

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 329.

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 458.

Depth $2\frac{1}{2}$, length of head $3\frac{1}{3}$–$3\frac{1}{2}$, in length. Eye 3–$3\frac{1}{3}$ in length of head. Serrae of preopercle slightly enlarged at angle, which is rounded. D X 17, 1st and 2nd spines shortest, 3rd slightly longer than 4th. A III 7. Caudal emarginate, outer rays more or less produced. Scales on soft dorsal and anal, snout, interorbital, and maxilla; l.l. 37; l.tr. $\frac{3}{16}$. Gill-rakers 25 on lower part of anterior arch.

Length.—Up to 90 mm.

Colour.—Rosy, more or less brownish on back, with or without ill-defined cross-bands, a broad pale streak from eye to base of pectoral.

Locality.—Natal coast.

Distribution.—East Indies.

**Anthias* (*Sacura*) *natalensis* Fowl.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 226, text-fig. 2.

Depth 2, length of head nearly 3, in length of body. Eye $4\frac{1}{3}$ in length of head, about equal to snout. Maxilla reaching to below centre of eye. Serrae of preopercle minute. Tongue (?) smooth. D X 18, 1st and 2nd spines shortest, 4th and 5th longest, 3rd ray produced in a filament which reaches base of caudal. A III 8, spines short, 3rd $3\frac{1}{2}$ in length of head. Ventral rays not produced. Caudal lunate, lobes filamentous. Scales: l.l. 42; l.tr $\frac{9}{18}$. Gill-rakers 24 on lower part of anterior arch.

Length.—438 mm.

Colour.—Uniform pale brown, probably rosy in life.

Locality.—Natal coast, 25 fathoms.

Type in Philadelphia Academy of Sciences.

Allied to the Japanese *margaritaceus* Hilg.

Gen. Callanthias Lowe.

1839. Lowe, Proc. Zool. Soc., p. 76.

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 333.

1899. Ogilby, Proc. Linn. Soc. N.S.W., vol. xxiv, p. 175 (*Anogramma*).

1919. Fage, Dan. Ocean. Exp., vol. ii, A 3, p. 33 (post-larval stages).

Scales ctenoid. Maxilla exposed, without supplemental bone. Teeth villiform in jaws, with canines; a few teeth on vomer and palatines, none on tongue. Preopercle not serrated. Gill-rakers very long and slender. Spinous portion of dorsal longer than soft portion, not divided by a notch. Anal with 3 spines. Dorsal and anal not scaly. Caudal emarginate. Lateral line single, running close to base of dorsal fin and lost on upper surface of caudal peduncle or under last dorsal rays.

Mediterranean and neighbouring parts of Atlantic, Australasia, west coast of S. America.

**Callanthias allporti* Gnthr.

1876. Günther, Ann. Mag. Nat. Hist., (4), vol. xvii, p. 390.

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 335, pl. xv.

1899. *Id.*, Ann. Mag. Nat. Hist., (7), vol. iii, p. 346 (*platei* nec Steindachner).

1911. McCulloch, Sci. Res. " Endeavour," vol. i, p. 51.

1921. Waite, Rec. S. Austr. Mus., vol. ii, pt. 1, p. 91, fig. 137.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 13.

Depth $2\frac{3}{5}$ (adult)–$3\frac{1}{10}$ (young), length of head $3\frac{4}{5}$–$4\frac{3}{5}$ (adult), in length of body. Eye $2\frac{2}{3}$–$3\frac{1}{3}$ in length of head, greater than snout. Lower jaw not projecting. Canines strong. Vomerine teeth often small or absent. Maxilla reaching to below centre of eye. Gill-rakers 26 on lower part of anterior arch. D XI 10–11, spines graduated. A III 10. Height of vertical fins varying with age (McCulloch). Caudal slightly emarginate. Scales : l.l. 42–43, ending on caudal peduncle ; l.tr. $\frac{1}{18\text{–}20}$.

Length.—Up to 300 mm.

Colour.—Uniform red, vertical fins with violet margins.

Locality.—Natal coast.

Distribution.—S. and S.E. Australia, Tasmania.

Gen. Therapon Cuv.

1817. Cuvier, Règne Anim., vol. ii, p. 295.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iii, p. 138 (*Datnia*) and p. 145 (*Pelates*).

1876. Bleeker, Arch. Neerl. Sci. Nat., vol. xi, p. 267 (*Mesopristes*).

1915. Boulenger, Freshw. Fish. Afr., vol. iii, p. 113.

1916. Ogilby and McCulloch, Mem. Queensl. Mus., vol. v, p. 99.

Scales ctenoid. Maxilla exposed, without supplemental bone. Teeth villiform in jaws, with an outer series of canines ; small teeth on vomer and palatines. Preorbital usually serrated. Preopercle serrated. Opercle with the lower spine usually strong. Supra-scapula as well as the coracoid usually exposed and denticulate. Gill-rakers short, stout. Spinous and soft dorsal divided by a notch. Anal with 3 spines. Dorsal and anal with a scaly sheath at base. Caudal rounded, truncate, or emarginate. Lateral line single, not close to dorsal profile.

Moderate-sized fishes from the Indian and Pacific Oceans, sometimes

entering rivers. The species are somewhat dissimilar in external appearance, and several genera have been proposed.

Key to the South African species.

1. Body ovate.
   a. Lower opercular spine very strong (*Therapon*).
      i. 7–8 scales between lateral line and spinous dorsal . . *theraps.*
      ii. 14–15 scales between lateral line and spinous dorsal . *jarbua.*
   b. Opercular spines feeble (*Pelates*) . . . . . *quadrilineatus.*
2. Body elevated. Lower opercular spine not strong and prominent (*Mesopristes*, syn. *Datnia*) . . . . . *argenteus.*

**Therapon theraps* C. and V.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iii, p. 129, pl. liii.

1913. Weber, " Siboga " Exped. Monogr., 57, p. 255, fig. 64 (colour variations of young).

1916. Ogilby and McCulloch, Mem. Queensl. Mus., vol. v, p. 102.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 131 (references).

Body ovate. Depth $3\frac{1}{3}$, length of head $3\frac{1}{2}$–4, in length of body. Eye equal to snout, $3\frac{1}{2}$ in length of head, a little greater than interorbital width. Maxilla reaching to below anterior margin of eye. Preorbital serrated. Lower opercular spine very strong. Suprascapular and coracoid strongly denticulate. D XII 10, 3rd–5th spines longest. A III 8–9. Caudal forked. Scales : l.l. 50–55, 7–8 between lateral line and dorsal ; 5–6 series on cheek. Nostrils close together.

Length.—Up to 170 mm.

Colour.—In adult, silvery with 3 (sometimes 4) black longitudinal stripes (usually straight), a large black blotch between 3rd and 7th dorsal spines, soft dorsal with dark margin, anal with a dark band, caudal with 2 oblique dark bands on each lobe ; in the young reddish-brown with 5 vertical silvery cross-bands ; these silver cross-bands gradually break up into spots and then become longitudinally elongated, spreading over the whole side and restricting the dark colour to the 3 stripes found in the adult.

Locality.—False Bay.

Distribution.—East coast of Africa, Indian seas, China, Australia, and Western Pacific.

Günther's record of a specimen from False Bay seems to be the only record of this species in South African waters.

**Therapon quadrilineatus* (Bl.).

1797. Bloch, Ausländ. Fische, vol. iv, p. 63, pl. ccxxxviii, fig. 2.

1878–88. Day, Fish. Ind., p. 70, pl. xviii, fig. 5.

1916. Ogilby and McCulloch, Mem. Queensl. Mus., vol. v, p. 125.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 233.

Body ovate. Depth $2\frac{5}{8}$–$3\frac{1}{3}$, length of head $3\frac{1}{8}$–$3\frac{1}{4}$, in length of body. Eye 3–$3\frac{1}{3}$ in length of head, 1–$1\frac{1}{2}$ in snout. Maxilla reaching to below anterior margin of eye. Preorbital slightly serrated. Opercular spines feeble. Suprascapular not denticulate. D XI–XII 10, 5th spine longest. A III 10. Caudal forked. Scales : l.l. 65–70 ; 11–15 between lateral line and spinous dorsal ; 4–5 rows on cheek.

Length.—Up to 150 mm.

Colour.—Silvery, darker above, with 5 olive-brown or blackish longitudinal straight stripes, a blackish spot on shoulder, a black blotch between 3rd–7th dorsal spines ; soft dorsal with a black band along middle ; pectorals, ventrals, and anal yellow ; caudal yellowish with dark edge or darker rays, but no bands.

Locality.—Delagoa Bay.

Distribution.—Indian seas, East Indies to China and N. Australia.

Therapon jarbua (Forsk.).

Sea Tiger-fish.

1775. Forskal, Descr. Anim., p. 50.

1790. Bloch, Ausl. Fische, vol. iv, p. 80, pl. ccxxxviii, fig. 1 (*servus*).

1915. Boulenger, Freshw. Fish. Afr., vol. iii, p. 113, fig. 86.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 130 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 346 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 232.

Body ovate. Depth $2\frac{3}{5}$–$3\frac{1}{4}$, length of head 3–$3\frac{1}{2}$, in length of body. Eye 3 (young)–$3\frac{3}{4}$ in length of head, subequal to snout in adult, and to interorbital width. Maxilla reaching to below anterior third or centre of eye. Preorbital serrated, serrae obsolete in large individuals. Lower opercular spine very strong. Suprascapula and coracoid strongly denticulate. D XI–XII 10–11, 3rd–5th spines longest. A III 7–9. Caudal forked. Scales : l.l. 80–90, 13–15 between lateral line and dorsal ; 8–10 series on cheek. Nostrils close together.

Length.—Up to 300 mm.

Colour.—Silvery, darker above, with 3 longitudinal (usually curved)

dark or black stripes, a black blotch between 3rd–7th dorsal spines; soft dorsal with dark margin; caudal with a central horizontal dark stripe and 2 oblique bars on each lobe. The young do not differ from the adults in coloration.

Locality.—Natal coast, Portuguese East Africa.

Distribution.—Indian seas, China, Australia, Western Pacific.

**Therapon argenteus* (C. and V.).

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iii, p. 139, pl. liv (*Datnia argentea*).

1878–88. Day, Fish. India, p. 71, pl. xviii, fig. 7 (*Datnia argentea*).

1916. Ogilby and McCulloch, Mem. Queensl. Mus., vol. v, p. 115 (synonymy).

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 132 (references).

Body elevated, profile from 1st dorsal spine to the sharply pointed snout almost straight. Depth $2\frac{1}{2}$–$2\frac{2}{3}$, length of head $2\frac{2}{3}$–3. Eye shorter than snout, $3\frac{1}{3}$–$4\frac{1}{3}$ in length of head, greater than interorbital width. Maxilla not reaching to below anterior margin of eye. Preorbital serrated. Lower opercular spine not very strong, not produced beyond edge of opercular flap. Suprascapula and coracoid denticulate. D XII 10, spines strong, 4th and 5th longest. A III 8–9, 2nd spine strong and long. Caudal forked. Scales: l.l. 55–56; 7–8 between lateral line and spinous dorsal; 8–9 series on cheek. Nostrils moderately close together.

Length.—Up to 270 mm.

Colour.—Silvery, darker on back, a narrow black edge to the spinous dorsal; soft dorsal and anal dusky. In the young 3 narrow longitudinal dark stripes on the sides.

Locality.—Cape seas.

Distribution.—Indian seas, East Indies, Australia.

Günther's record of a specimen in the British Museum appears to be the only record of this species in South African waters, and it seems doubtful if the species should really be admitted to the fauna-list.

Gen. Plectropoma Cuv.

1817. Cuvier, Règne Anim., vol. ii, p. 277.

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 159.

Scales very small, more or less ctenoid. Mouth large. Maxilla exposed, with supplemental bone. Teeth in jaws in several series,

the inner ones depressible ; canines strong ; teeth on vomer and palatines, none on tongue. Preopercle entire or finely serrate, lower margin with antrorse spines. Opercle with 3 spines. Gill-rakers moderate. Dorsal with 6–8 spines, spinous portion nearly as long as soft, not divided by a notch. Anal with 3 very feeble, flexible spines. Caudal truncate or emarginate. Lateral line single, the tubes straight, very short.

A small genus of Indo-Pacific fishes distinguished from the following genus, *Epinephelus*, by the antrorse spines on the preopercle and the feeble anal spines.

**Plectropoma maculatum* (Bl.).

1790. Bloch, Ausl. Fische, vol. iv, p. 48, pl. ccxxviii.

1873. Günther, Fische d. Südsee, p. 10, pl. x.

1876. Bleeker, Atl. Ichthyol., vol. vii, pp. 25, 26, pl. ccxci, fig. 3 ; pl. ccxcvi, fig. 3 (*Paracanthistius leopardinus* and *maculatus*).

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 160 (synonymy).

Depth about equal to length of head, $3\frac{1}{4}$–4 in length of body. Eye 5–$7\frac{1}{2}$ in length of head, $1\frac{1}{2}$ (young)–3 in snout, slightly less than interorbital width. Preopercle with 3–4 antrorse spines. Gill-rakers 9–10 plus rudiments on lower part of anterior arch. D VII–VIII 11–12, 3rd or 4th spines longest, nearly $\frac{1}{3}$ length of head, margin of soft dorsal not concave. A III 8, 1st spine rudimentary, 3rd longest, margin not concave. Caudal truncate or feebly emarginate. Scales : l.r. 120–145 ; l.tr. $\frac{16–20}{60–80}$; l.l. 80–106.

Length.—Up to 1060 mm.

Colour.—Yellow, brownish, or reddish, with or without dark cross-bands, numerous black-edged blue spots which may be smaller or larger, or elongated streak-like ; pectoral and ventrals sometimes with a black blotch at base.

Locality.—Mozambique coast.

Distribution.—Indo-Pacific Ocean.

Gen. Epinephelus Bl.

Rock-cods.

1793. Bloch, Ausl. Fische, vol. vii, p. 11.

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 162.

1926. Opinion 93, Intern. Comm. Nomencl., Smiths. Misc. Coll., vol. lxxiii, p. 7.

Scales small, cycloid or ctenoid. Mouth large. Maxilla exposed, with supplemental bone. Teeth in jaws in 2 or more series, the inner ones depressible ; canines more or less developed ; teeth on vomer and palatines, but none on tongue. Preopercle serrated. Opercle with 1, 2, or 3 spines. Gill-rakers varying in length. Dorsal with 9–11 (or 12) spines, spinous and soft portions of dorsal subequal, or the former longer, not divided by a notch. Anal with 3 strong spines. Caudal emarginate, truncate, or rounded. Lateral line single, the tube with ascending tubule, rarely branched.

A very large genus of moderate- or large-sized fishes from temperate and tropical seas. They are all valuable food-fishes.

In South Africa the genus is well represented on the Natal coast ; at the Cape only one species occurs as an occasional visitor.

Regan (1917, Ann. Durban Mus., vol. i, pt. 5, p. 458) has recorded *E. australis* Blgr. from Natal, and adds in a footnote, " Perhaps identical with *E. melas* Peters." *E. australis* is an Australian species, and *melas*, regarded by Boulenger as an insufficiently diagnosed species, has not yet been recorded from South African waters. Gilchrist and Thompson's specimen of *melas* is really *miniatus* (q.v.). I therefore omit both *australis* and *melas* from the fauna-list.

Key to the South African species.

I. Dorsal spines IX.
  A. Scales above lateral line 10–15.
    1. Lateral line 75–82. Brown . . . . . *taeniops.*
    2. Lateral line 65–75. Red . . . . . *sonnerati.*
    3. Lateral line 50–55. Brown . . . . . *argus.*
  B. Scales above lateral line 7–10.
    1. Pectoral dark, with yellow edge . . . . *hemistictus.*
    2. Pectoral light . . . . . *miniatus.*

II. Dorsal spines XI.
  A. Teeth in 2 series on side of mandible.
    1. Anal rays 8.
      a. Caudal truncate or emarginate.
        i. Scales above lateral line 20–25. Pectoral yellow *flavocaeruleus.*
        ii. Scales above lateral line 11–16.
          a. Dorsal rays 14–15. L.l. 60–72.
            * Longest dorsal spine $\frac{1}{3}$ head.
              † Scales above l.l. 13–16 *praeopercularis.*
              †† Scales above l.l. 18–20 *albomarginatus.*
            ** Longest dorsal spine $\frac{2}{5}$–$\frac{2}{3}$ head . *morrhua.*

β. Dorsal rays 16–17. L.l. 52–60.
* Two strong spines on angle of preopercle *diacanthus.*
** Serrae merely enlarged on angle of preopercle *maculatus.*

b. Caudal rounded.
i. Scales above l.l. mostly cycloid.
a. L.l. 55–60 . . . . . *gilberti.*
β. L.l. 78–82 . . . . . *andersoni.*
ii. Scales above l.l. mostly ctenoid . *grammatophorus.*
2. Anal rays 9. Dorsal rays 14 . . . . . *modestus.*

B. Teeth in 3 or more series on side of mandible.
1. Lower opercular spine further back than upper.
a. 3rd–5th dorsal spines much longer than last.
i. Scales 85–110, $\frac{9–13}{35–43}$, l.l. 55–60 . . *ascensionis.*
ii. Scales 100–120, $\frac{12–17}{42–55}$, l.l. 60–80 . . . *gigas.*
b. Dorsal spines subequal from 3rd or 4th.
i. Eye 4–5½ in head.
a. Red, spinous dorsal black-tipped . . *fasciatus.*
β. Brown, reticulated . . . . *merra.*
ii. Eye 5–8 in head. Brown, spotted . . *tauvina.*
2. Lower opercular spine not further back than upper.
a. Dorsal rays 15–16. Interorbital width 7–8 in head *caeruleopunctatus.*
b. Dorsal rays 13–15. Interorbital width 4–7 in head.
i. L.l. tubes not branched . . . *fuscoguttatus.*
ii. L.l. tubes branched . . . . *lanceolatus.*

As the species of this genus are often difficult to identify, the following colour synopsis may be found useful. It is only applicable to fresh adult specimens; young individuals in many cases differ considerably from the adults, being lighter in colour and more distinctly spotted or marked, whereas the adults tend to grow darker and more uniform in coloration. Preserved specimens lose their colour and markings to a large extent, especially the red, orange, and blue colours.

1. Ground colour red.
D IX. { Blue spots (dark spots if preserved) . . . . *miniatus.*
{ Blue network on head . . . . . *sonnerati.*
D XI. Spinous dorsal tipped with black . . . . *fasciatus.*
2. Head red, body brownish; head with blue spots and lines . *grammatophorus.*
3. Ground colour brown.
With pale (bluish or whitish) spots or blotches.
D IX . . . . . *taeniops, argus, hemistictus.*
D XI . . . . . *ascensionis, caeruleopunctatus.*
With dark spots . . *praeopercularis, morrhua, diacanthus, maculatus, andersoni, tauvina, fuscoguttatus.*

4. Brown, with light honeycomb or polygonal network.
   Scales cycloid . . . . . *gilberti.*
   Scales ctenoid . . . . . *merra.*
5. Uniform brown . . . . . *modestus, gigas, lanceolatus.*
6. Pectoral fin yellow.
   D IX. Edge only of pectoral yellow . . . . *hemistictus.*
   D XI. Pectoral wholly yellow . . *flavocaeruleus, albomarginatus.*

**Epinephelus taeniops* (C. and V.).

1828. Cuvier and Valenciennes, Hist. Nat. Poiss, vol. ii, p. 370.

1881. Steindachner, Denkschr. Ak. Wiss. Wien, vol. xliv, p. 20, pl. i, fig. 1.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 120 (references).

Depth 3–3$\frac{1}{5}$, length of head 2$\frac{4}{5}$–3, in length of body. Eye 5–6 in length of head, less than snout, but greater than interorbital width. Teeth in 3–4 series on sides of mandible ; canines strong. Preopercle very finely serrated, serrae scarcely enlarged at angle. Gill-rakers 10–11 plus 6–8 rudiments on lower part of anterior arch, longest longer than gill-fringes. D IX 15, 3rd longest, $\frac{1}{3}$ length of head. A III 9 (rarely 10), 2nd and 3rd spines equal. Caudal rounded. Scales ctenoid, except on head : l.r. 125–130 ; l.tr. $\frac{10–12}{42–48}$; l.l. 75–82.

Length.—Up to 320 mm.

Colour.—Dark brown, with small blue, black-edged spots, a blue horizontal streak below eye ; soft dorsal, anal, and caudal edged with blue.

Locality.—South African seas.

Distribution.—West coast of tropical Africa. Said to stray to the Bahamas and Florida coast, but not reckoned in the American fauna. Its occurrence in South African waters is also doubtful, but it may possibly be found off the coast of Angola and may occasionally come still further south.

Epinephelus sonnerati (C. and V.).

Sonnerat's or Scarlet Rock-cod.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 299.

1878–88. Day, Fish. India, p. 25, pl. vii, fig. 1.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 333 (references and synonymy).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 223.

Depth $2\frac{2}{3}$–3, length of head $2\frac{3}{4}$–$3\frac{1}{2}$, in length of body. Eye 5–7 in length of head, 2 in snout, about equal to interorbital width. Teeth in 3–5 series on sides of mandible; canines moderate. Preopercle feebly serrated. Gill-rakers 9–12 plus 5–6 rudiments on lower part of anterior arch, longest about equal to gill-fringes. D IX 15, 3rd spine longest, about $\frac{1}{4}$–$\frac{1}{3}$ in length of head. A III 9, 2nd and 3rd spines equal. Caudal rounded. Scales ctenoid, except on head: l.r. 110–140; l.tr. $\frac{11\text{–}14}{43\text{–}52}$; l.l. 65–75.

Length.—Up to 540 mm.

Colour.—Red, with a more or less distinct bluish network on head, body and fins with or without small bluish or whitish spots, all the fins edged with black.

Locality.—Natal coast, Delagoa Bay.

Distribution.—Indian and Western Pacific Oceans.

Fowler (1925, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 220) records a specimen from Delagoa Bay under the name *aurantius* C. and V. His description differs from that of Boulenger (1895, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 193), mainly in the scale-counts, though it should be noted that Fowler's scale-counts, especially that of the scales in a transverse direction, are often considerably greater than those of Boulenger and other authors. Boulenger, from an examination of the type of *aurantius*, gives the scales as: l.r. 90–105; l.tr. $\frac{8\text{–}10}{32\text{–}40}$; l.l. 51–55.

**Epinephelus argus* (Bl. Schn.).

1801. Bloch Schneider, Syst. Ichth., p. 311.

1876. Bleeker, Atl. Ichthyol., vol. vii, p. 43, pl. cccxlii, fig. 3.

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 189 (synonymy).

Depth $2\frac{3}{4}$–3, length of head $2\frac{3}{4}$–$3\frac{1}{4}$, in length of body. Eye 5–6 in length of head, $1\frac{1}{2}$–2 in snout, greater than interorbital width. Teeth in 4–5 series on sides of mandible; canines rather strong. Preopercle finely serrated. Gill-rakers 8–9 plus rudiments on lower part of anterior arch, longest nearly as long as gill-fringes. D IX 15–16, 3rd or 4th spine longest, nearly $\frac{1}{3}$ length of head. A III 9, 2nd and 3rd spines equal. Caudal rounded. Scales ctenoid: l.r. 95–110; l.tr. $\frac{9\text{–}10}{32\text{–}38}$; l.l. 50–55.

Length.—Up to 430 mm.

Colour.—Dark reddish-brown or blackish, with more or less distinct vertical cross-bars ; head, body, and fins with small, round, black-edged blue spots ; dorsal, anal, and caudal with yellowish margins.

Locality.—Mozambique coast.

Distribution.—Indo-Pacific Ocean.

**Epinephelus hemistictus* (Rüpp.).

1828. Rüppell, Atl. Fische Roth. Meer., p. 109, pl. xxvii, fig. 3.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 329 (references).

Depth equal to length of head, $2\frac{3}{4}$–3 in length of body. Eye 5–$5\frac{1}{2}$ in length of head, less than snout, greater than interorbital width. Teeth in 2–3 series on side of mandible ; canines moderate or strong. Preopercle very finely serrated, serrae scarcely enlarged at angle. Gill-rakers 9–10 plus rudiments on lower part of anterior arch, longest nearly as long as gill-fringes. D IX 14, 3rd or 4th spine longest, nearly $\frac{1}{3}$ length of head. A III 9, 2nd and 3rd spines equal. Ventrals reaching vent. Caudal rounded. Scales ctenoid, except on head : l.r. 95–110 ; l.tr. $\frac{7–9}{35–39}$; l.l. 50–55.

Length.—Up to 200 mm.

Colour.—Dark brown, head and lower half of body with blue, black-edged dots ; soft dorsal, anal, and caudal blackish, dotted with blue, with narrow white edge ; pectoral blackish, broadly edged with yellow.

Locality.—Zululand coast.

Distribution.—East coast of Africa.

Epinephelus miniatus (Forsk.).

Red-spotted Rock-cod.

1775. Forskal, Desc. Anim., p. 41.

1878–88. Day, Fish. India, p. 24, pl. vi, fig. 2.

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 3, p. 220 (*melas* non Peters).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 331 (references and synonymy).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 221 (*Cephalopholis m.*).

PLATE XX.

FIG.		TEXT-PAGE
1.	*Palunolepis grandis* (Gnthr.) (original photo)	457
2.	*Epinephelus albomarginatus* Blgr. (after Boulenger)	477
3.	*Acanthistius sebastoides* (Cast.) (original photo)	489
4.	*Plesiops nigricans* (Rüpp.) (after Day)	494



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Depth $2\frac{3}{4}$–3, length of head $2\frac{3}{4}$–$3\frac{1}{4}$, in length of body. Eye 5–6 in length of head, about equal to interorbital width and less than snout. Teeth in 2–3 series on side of mandible; canines moderate. Preopercle finely serrated, serrae scarcely enlarged at angle. Gill-rakers 9–10 plus several rudiments on lower part of anterior arch. D IX 15–16, 3rd spine longest, $\frac{1}{3}$ length of head. A III 9, 2nd and 3rd spines equal. Ventrals not reaching vent. Caudal rounded. Scales ctenoid, except on head: l.r. 105–115; l.tr. $\frac{8–10}{40–45}$; l.l. 50–60.

Length.—Up to 410 mm.

Colour.—Orange or red, with blue, black-edged spots; unpaired fins spotted; pectoral orange at base, shading off into golden; ventrals crimson, with upper edge blue.

Locality.—Natal coast.

Distribution.—Indian and Western Pacific Oceans.

The specimen, doubtfully identified by Gilchrist and Thompson as *melas* Peters, proves to belong to this species. The description is erroneous in several points, though there is no doubt that the specimen I have examined is the identical one described by these authors.

Epinephelus flavocaeruleus (Lacep.).

Yellow and Blue Rock-cod.

1802. Lacépède, Hist. Nat. Poiss., vol. iv, p. 367.

1878–88. Day, Fish. India, p. 15, pl. iii, fig. 1.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 327 (references and synonymy).

Depth $2\frac{2}{5}$–$2\frac{4}{5}$, length of head $2\frac{3}{5}$–3, in length of body. Eye 4–6 in length of head, $1\frac{1}{4}$–$1\frac{3}{4}$ in snout, $1\frac{1}{2}$–$1\frac{3}{4}$ in interorbital width. Teeth in 2 series on side of mandible; canines small. Preopercle finely serrated, serrae slightly enlarged on angle which is rounded and slightly produced. Gill-rakers 16–18 on lower part of anterior arch, nearly as long as gill-fringes. D XI 15–17, 3rd or 4th spine longest, $\frac{2}{5}$–$\frac{1}{2}$ length of head. A III 8, 2nd spine a little shorter than 3rd. Caudal emarginate. Scales ctenoid, except on head: l.r. 130–150; l.tr. $\frac{20–25}{55–65}$; l.l. 65–75.

Length.—Up to 460 mm.

Colour.—Pale lilac to dark purplish-blue, with or without dark dots on body and fins; fins wholly or partially yellow, pectorals uniform yellow.

Locality.—Natal coast.

Distribution.—Indian and Western Pacific Oceans.

The ground colour and the extent of the yellow colour on the unpaired fins varies considerably.

Epinephelus praeopercularis Blgr.

1887. Boulenger, Proc. Zool. Soc., p. 654.

1895. *Id.*, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 207, pl. v.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 333.

Depth 3–3½, length of head 2½–3, in length of body. Eye about equal to interorbital width, 4½–5⅓ in length of head, less than snout. Teeth in 2 series on side of mandible; canines strong. Preopercle finely serrated, concave above the produced angle which bears several strong spines. Gill-rakers 15–16 (11 plus rudiments) on lower part of anterior arch. D XI 14–15, 3rd spine longest, ⅓ length of head. A III 8, 2nd and 3rd spines about equal. Caudal truncate in adult, rounded in young. Scales mostly ctenoid: l.r. 120–125; l.tr. $\frac{13\text{–}16}{45\text{–}55}$; l.l. 65–72.

Length.—Up to 800 mm.

Colour.—Brown, sides spotted or dotted with black, one or two dark streaks from eye across opercle, unpaired fins blackish with narrow white border.

Locality.—Natal coast.

Distribution.—Persian Gulf.

This species seems doubtfully distinct from *morrhua*. Boulenger separates the two forms on the relative lengths of the longest spine, *morrhua* having a longer spine than *praeopercularis*. Gilchrist and Thompson, however, describe two specimens of *morrhua* (1909, Ann. S. Afr. Mus., vol. vi, pt. 3, p. 217) with a relatively short spine, and one specimen of *praeopercularis* (1914, *ibid.*, vol. xiii, pt. 3, p. 66) with a relatively long spine. From personal inspection I can confirm this. The main difference between the specimens is the smaller size of the scales in the specimen identified as *praeopercularis*, a difference which is clear at the first glance.

Epinephelus morrhua (C. and V.).

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 434.

1878–88. Day, Fish. India., p. 21, pl. v, fig. 1.

1910. Jordan and Richardson, Proc. U.S. Nat. Mus., vol. xxxvii, p. 454, fig. 11.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 332 (references and synonymy).

Depth 3–3$\frac{1}{3}$, length of head 2$\frac{1}{2}$–2$\frac{3}{4}$, in length of body. Eye less than interorbital width and than snout, 5–5$\frac{1}{2}$ in length of head. Teeth in 2 series on side of mandible; canines strong. Preopercle finely serrated, concave about angle which is produced and bears several strong spines. Gill-rakers 15–16 on lower part of anterior arch, as long as gill-fringes. D XI 14–15, 3rd or 3rd and 4th spines longest, $\frac{2}{3}$–$\frac{3}{5}$ length of head. A III 8, 2nd and 3rd spines equal. Caudal truncate in adult, rounded in young. Scales mostly ctenoid: l.r. 105–115; l.tr. $\frac{12–15}{45–55}$; l.l. 60–65.

Length.—Up to 540 mm.

Colour.—Brown, with undulating oblique stripes or series of dots, being the remnants of well-marked stripes in young; 3–4 oblique streaks on head; soft dorsal and caudal usually spotted.

Locality.—Natal and Zululand coast.

Distribution.—Indian and Western Pacific Oceans to Japan.

Epinephelus albomarginatus Blgr.

White-margined Rock-cod.

1903. Boulenger, Ann. S. Afr. Mus., vol. iii, pt. 3, p. 65, pl. iv.

1909. Gilchrist and Thompson, *ibid.*, vol. vi, pt. 3, p. 216.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 325.

Depth about equal to length of head, 3 in length of body. Eye equal to snout, 4 in length of head, slightly greater than interorbital width. Teeth in 2 series on side of mandible; canines strong. Preopercle finely serrated, slightly concave above angle which bears 3–5 strong spines. Gill-rakers 13–15 on lower part of anterior arch, as long as gill-fringes. D XI 14, 3rd–5th spines longest. A III 8, 3rd spine longest. Caudal subtruncate. Scales ctenoid, snout scaly, maxilla naked: l.r. 110–120; l.tr. $\frac{18–20}{50}$; l.l. 63–65. (Plate XX, fig. 2.)

Length.—Up to 320 mm.

Colour.—Reddish-brown, with numerous small round spots, belly unspotted; pectoral yellow, other fins dark, edged with white; soft dorsal and caudal more or less distinctly spotted.

Locality.—East London, Natal, and Zululand coast.
Type in British Museum.

**Epinephelus diacanthus* (C. and V.).

Two-spined Rock-cod.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 319.
1878–88. Day, Fish. India, p. 209, pl. iii, fig. 4.
1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 209 (synonymy).
1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321.
1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 222.

Depth 3–3½, length of head 2½–3, in length of body. Eye greater than interorbital width, 4½–5½ in length of head, slightly less than snout. Teeth in 2 series on side of mandible; canines moderate. Preopercle finely serrated, angle often produced, armed with 2–5, usually 2, very strong spines. Gill-rakers 15–16 on lower part of anterior arch, not longer than gill-fringes. D XI 16–17, 3rd or 3rd and 4th spines longest. A III 8, 2nd and 3rd spines about equal. Caudal subtruncate in adult, rounded in young. Scales mostly ctenoid: l.r. 105–120; l.tr. $\frac{11–15}{40–46}$; l.l. 52–60.

Length.—Up to 520 mm.

Colour.—Brown, with or without dark spots, with 5–6 dark vertical cross-bands, fins unspotted, dark at ends, often a dark streak across cheek.

Locality.—Natal coast.

Distribution.—East coast of Africa, Indian seas, China, Japan.

Epinephelus maculatus (Bl.).

Spotted Rock-cod.

1790. Bloch, Ausl. Fische, vol. iv, p. 96, pl. ccxlii, fig. 3.
1876. Bleeker, Atl. Ichthyol., vol. vii, p. 50, pls. cclxxxv, fig. 1; cclxxxvi, fig. 3; cclxxxix, fig. 2; ccciv, fig. 2.
1878–88. Day, Fish. India, p. 14, pl. ii, fig. 4.
1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 330 (references and synonymy).

Depth 3⅕, length of head 3, in length of body. Eye 5–6 in length of head, greater than interorbital width, less than snout. Teeth in 2

series on side of mandible ; canines strong. Preopercle finely serrated, serrae enlarged on slightly produced angle. Gill-rakers 10–12 plus 4–6 rudiments on lower part of anterior arch ; long, slender, longer than gill-fringes. D XI 16–17, 3rd or 4th spine longest. A III 8, 3rd spine longest. Caudal subtruncate in adult, rounded in young. Scales mostly ctenoid : l.r. 105–110 ; l.tr. $\frac{12–15}{40–45}$; l.l. 53–56.

Length.—Up to 400 mm.

Colour.—Brown, with round dark spots, pectoral and often also the other fins spotted ; young with black spots and large bluish-white blotches, the largest being a cross-bar in front of dorsal and a vertical bar on hind half of spinous dorsal descending to lateral line.

Locality.—Natal and Zululand coast.

Distribution.—Indian and Western Pacific Oceans.

**Epinephelus gilberti* (Rich.).

Gilbert's Rock-cod.

1842. Richardson, Ann. Mag. Nat. Hist., vol. ix, p. 19.

1891. Sauvage, Hist. Madagasc. Poiss., p. 75, pl. viii, fig. 1 (*cylindricus*).

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 220 (references and synonymy).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321.

Depth $3\frac{1}{2}$–$3\frac{3}{4}$, length of head 3–$3\frac{1}{2}$, in length of body. Eye equal to snout, 5 in length of head, greater than interorbital width. Teeth in 2 series on side of mandible ; canines moderate. Preopercle serrated, angle slightly produced, with enlarged serrae. Gill-rakers 15–17 on lower part of anterior arch. D XI 16–17, 3rd or 4th spine longest. A III 8, 2nd and 3rd spines subequal. Caudal rounded. Scales mostly cycloid : l.r. 95–110 ; l.tr. $\frac{10–12}{38–40}$; l.l. 55–60.

Length.—Up to 400 mm.

Colour.—Brown or blackish, with a pale polygonal network on head and body, unpaired fins with large dark spots, pectoral dark with narrow white edge, caudal also with narrow white edge.

Locality.—Natal coast.

Distribution.—Indian Ocean, East Indies, North Australia.

Epinephelus andersoni Blgr.

Anderson's Rock-cod.

1903. Boulenger, Ann. S. Afr. Mus., vol. iii, pt. 3, p. 66, pl. v.

1909. Gilchrist and Thompson, *ibid.*, vol. vi, pt. 3, p. 218.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 325.

Depth $3\frac{1}{4}$–$4\frac{1}{3}$, length of head 3, in length of body. Eye equal to interorbital width, 6 in length of head, less than snout. Teeth in 2 series on side of mandible; canines small. Preopercle serrated, serrae coarser at angle. Gill-rakers 16 on lower part of anterior arch, shorter than (most of them much shorter than) gill-fringes. D XI 15, 3rd and 4th spines longest. A III 8, 2nd and 3rd spines equal. Caudal rounded. Scales mostly cycloid: l.r. 105–110; l.tr. $\frac{14–17}{32–36}$; l.l. 78–82.

Length.—Up to 395 mm.

Colour.—Pale purplish brown, with dark spots forming 5–7 longitudinal series, usually 2 oblique dark stripes from eye across opercle, dorsal and caudal spotted.

Locality.—East London, Natal, and Zululand coast.

Type in British Museum.

Epinephelus grammatophorus Blgr.

Streaked Rock-cod.

1903. Boulenger, Ann. S. Afr. Mus., vol. iii, pt. 3, p. 64, pl. iii.

1909. Gilchrist and Thompson, *ibid.*, vol. vi, pt. 3, p. 222.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 329.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 224 (*rivulatus* non C. and V.).

Depth 3–$3\frac{2}{5}$, length of head $2\frac{3}{5}$–$2\frac{3}{4}$, in length of body. Eye 4–$4\frac{2}{3}$ in length of head, less than snout, greater than interorbital width. Teeth in 2 series on side of mandible; canines strong. Preopercle serrated, serrae at angle enlarged. Gill-rakers 15 on lower part of anterior arch, nearly as long as gill-fringes. D XI 16–17, 3rd and 4th spines longest. A III 8, 2nd and 3rd spines equal. Caudal rounded. Scales ctenoid: l.r. 85–95; l.tr. $\frac{10}{40}$; l.l. 65–70.

Length.—Up to 330 mm.

Colour.—Red on head and front part of body, becoming brown

posteriorly, 3 broad irregular vertical bands, a red oval patch at base of pectoral, thin irregular blue (dark brown in preserved specimens) lines radiating from eye over snout, cheek, and opercle ; fins dark reddish brown.

Locality.—Natal coast.

Type in British Museum.

Epinephelus modestus G. and T.

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 3, p. 218.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 332.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 224.

Depth $2\frac{4}{5}$–3, length of head $2\frac{1}{2}$–$2\frac{3}{5}$, in length of body. Eye equal to interorbital width, 5–6 in length of head, less than snout. Teeth in 2 series on side of mandible ; canines small. Preopercle serrated, serrae at angle enlarged. Gill-rakers 17 on lower part of anterior arch (Fowler). D XI 14–16, 3rd spine longest. A III 9, 3rd spine longest. Caudal truncate. Scales ctenoid : l.r. 102–118 ; l.tr. $\frac{18–20}{42}$; l.l. 68–74.

Length.—Up to 407 mm. (type, 281 mm.).

Colour.—Uniform brown, darker above, anal with broad whitish margin.

Locality.—Pondoland and Natal coast.

Type in South African Museum.

I have seen only the type specimen ; it might well be considered as an example of *praeopercularis* with an extra anal ray. The preopercle, however, is scarcely concave above the angle.

Epinephelus ascensionis (Osb.).

Ascension Island Rock-cod.

1771. Osbeck, Voy. China, vol. ii, p. 96.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 116 (references and synonymy).

Depth 3–$3\frac{1}{2}$, length of head $2\frac{3}{4}$–3, in length of body. Eye less than snout and than interorbital, $4\frac{1}{2}$–6 in length of head. Teeth in 3 series on side of mandible ; canines moderate. Preopercle finely serrated, serrae at angle slightly enlarged. Gill-rakers 15–18 on lower part of anterior arch, slightly shorter than gill-fringes. D XI 16–17, 4th or

5th or 3rd–5th spines longest, $\frac{1}{3}$–$\frac{2}{5}$ length of head. A III 8, 2nd and 3rd spines subequal. Caudal subtruncate in adult. Scales mostly ctenoid : l.r. 90–110 ; l.tr. $\frac{9\text{–}13}{35\text{–}42}$; l.l. 55–60.

Length.—Up to 400 mm.

Colour.—Brown or olivaceous, with more or less distinct orange spots, whitish irregular blotches on sides, head, and fins ; fins more or less distinctly spotted like the body, with fine whitish edges.

Locality.—Table Bay and False Bay.

Distribution.—Tropical Atlantic.

This species seems to be only an occasional visitor to these coasts. A few specimens have been taken alive and placed in the Aquarium at St. James (False Bay), where they have lived for considerable periods.

Epinephelus gigas (Brün.).

? 1758. Linné, Syst. Nat., ed. 10, p. 285 (*Labrus guaza*).

1768. Brünnich, Ichth. Massil., p. 65, No. 81.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 270, pl. xxxiii.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 118 (*guaza*) (references and synonymy).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 327 (*guaza*) (references and synonymy).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321.

Depth nearly equal to length of head, $2\frac{1}{2}$–3, in length of body. Eye less than snout, 5 (young)–8 in length of head, interorbital width $4\frac{1}{2}$ (adult)–6 (young). Teeth in rather narrow bands in young, broader in adult ; canines small (or obsolete in old specimens). Preopercle serrated, serrae enlarged at angle. Gill-rakers moderately elongate, 15–16 on lower part of anterior arch. D XI 14–16, 4th or 5th spine longest, $\frac{2}{5}$–$\frac{1}{2}$ length of head. A III 8, 2nd and 3rd spines equal. Caudal rounded or subtruncate. Scales mostly cycloid above lateral line, in old specimens nearly all cycloid : l.r. 100–120 ; l.tr. $\frac{12\text{–}17}{22\text{–}55}$; l.l. 60–80.

Length.—Up to 900 mm.

Colour.—Adult, uniform dark brown ; young often with grey, yellow, or red irregular marbling, fins edged with white.

Locality.—Natal coast.

Distribution.—Mediterranean and Atlantic Ocean, Angola.

In Rep. Natal Fisheries for 1919 (1920, p. 43) Robinson states that the record catch in Natal for Rock-cod is a specimen weighing 415 lb., which he identifies as this species. Since, however, *gigas* does not reach so large a size, the identification is probably erroneous; it is more likely that the specimen should have been identified as *lanceolatus* (*vide infra*).

Epinephelus fasciatus (Forsk.).

Red or Banded Rock-cod.

1775. Forskal, Desc. Anim., p. 40.

1876. Bleeker, Atl. Ichthyol., vol. vii, p. 66, pl. cccxxvi, fig. 3.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 326.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 223.

Depth 3–3¼, length of head 2⅔–3, in length of body. Eye greater than interorbital width, 4–5 in length of head, about equal to snout. Teeth in 3 series on side of mandible; canines small. Preopercle serrated, serrae at angle enlarged. Gill-rakers moderate, 15–16 on lower part of anterior arch. D XI 16, 3rd and 4th spines longest. A III 8, 2nd and 3rd spines subequal. Caudal subtruncate in adult. Scales ctenoid: l.r. 100–120; l.tr. $\frac{9–12}{36–42}$; l.l. 50–62.

Length.—Up to 330 mm.

Colour.—Bright red, with or without more or less distinct dark vertical cross-bands, with or without bluish-white spots, membrane between dorsal spines broadly tipped with black.

Locality.—Natal coast.

Distribution.—Indian and Western Pacific Oceans to Japan and Australia.

Epinephelus merra (Bl.).

Honeycomb Rock-cod.

1793. Bloch, Ausl. Fische, vol. vii, p. 17, pl. cccxxix.

1878–88. Day, Fish. India, p. 14, pl. ii, fig. 3.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 330 (references and synonymy).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 222.

Depth 3–3½, length of head 2⅗–3, in length of body. Eye greater than interorbital width, 4–5½ in length of head, equal to or less than snout. Teeth in 3–4 series on side of mandible; canines small or

moderate. Preopercle serrated, serrae enlarged at angle. Gill-rakers moderate, 15–17 on lower part of anterior arch. D XI 15–17, 4th or 5th spine longest. A III 8, 2nd and 3rd spines subequal. Caudal rounded, subtruncate. Scales mostly ctenoid : l.r. 95–120 ; l.tr. $\frac{10–13}{32–44}$; l.l. 55–70.

Length.—Up to 400 mm.

Colour.—Brown, with a honeycomb network of fine pale lines ; white spots may be present in addition, the pectoral may be dark spotted or unspotted.

Locality.—Natal coast.

Distribution.—Indian and Western Pacific Oceans to Australia.

Epinephelus tauvina (Forsk.).

Variegated Rock-cod.

1775. Forskal, Desc. Anim., p. 39.

? 1861. Castelnau, Mem. Poiss. Afr. Austr., p. 3 (*Serranus chabaudi*).

1878–88. Day, Fish. India, pp. 19, 20, pl. iv, figs. 2, 3 (*malabaricus* and *salmoides*).

1907. Stead, Add. Fish-fauna N.S.W., No. 1, p. 8, pl. ii.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 120 (references and synonymy).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 333 (references and synonymy).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 225.

Depth 3–3$\frac{2}{3}$, length of head 2$\frac{2}{3}$–3, in length of body. Eye less than snout, greater than interorbital width, 5 (young)–8 on length of head. Teeth in 3 series on side of mandible ; canines small. Preopercle serrated, serrae enlarged on slightly produced angle. Gill-rakers moderate, 9–11 plus 5–8 rudiments on lower part of anterior arch. D XI 15, 3rd or 4th spine longest. A III 8, 2nd and 3rd spines subequal. Caudal rounded. Scales mostly ctenoid : l.r. 100–120 ; l.tr. $\frac{12–15}{34–45}$; l.l. 60–70.

Length.—Up to 1270 mm.

Colour.—Brown, with darker spots or markings, or 5–6 more or less regular cross-bands frequently with black and white dots in addition, fins spotted ; old specimens nearly uniform.

Locality.—Natal coast.

Distribution.—Indian and Western Pacific Oceans to Australia.

Castelnau's *Serranus chabaudi*, which Boulenger doubtfully identifies with this species, came from Algoa Bay ; the description is inadequate for certain determination.

Epinephelus caeruleopunctatus (Bl.).

Blue-spotted Rock-cod.

1790. Bloch, Ausl. Fische, vol. iv, p. 94, pl. ccxlii, fig. 2.

1878–88. Day, Fish. India, p. 16, pl. iii, fig. 3 (*tumilabris* non C. and V.).

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 246 (references and synonymy).

1919. Regan, Ann. Durban Mus., vol. ii, pt. 4, p. 197.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 224.

Depth 3–3½, length of head 2⅔–3, in length of body. Eye 4½–5½ in length of head, greater than interorbital width, which is 7–8 in head, about equal to snout. Teeth in 3–4 series on side of mandible ; canines small. Preopercle finely serrated, serrae slightly enlarged at angle. Gill-rakers short, 15–18 on lower part of anterior arch. D XI 15–16, 3rd or 4th spine longest. A III 8, 2nd and 3rd spines equal. Caudal rounded. Scales mostly ctenoid : l.r. 105–110 ; l.tr. $\frac{12–15}{38–45}$; l.l. 55–65.

Length.—Up to 560 mm.

Colour.—Dark purplish-brown, with more or less distinct whitish or bluish spots ; maxillary groove edged with black.

Locality.—Natal coast.

Distribution.—Indian and Western Pacific seas.

Epinephelus fuscoguttatus (Forsk.).

Marbled Rock-cod.

1775. Forskal, Desc. Anim., p. 42 (*summana* var. *fuscoguttata*).

1828. Rüppell, Atl. Fische R. Meer., p. 108, pl. xxvii, fig. 2.

1876. Bleeker, Atl. Ichthyol., vol. vii, p. 57, pl. cccvii, fig. 3.

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 249 (references and synonymy).

1919. Regan, Ann. Durban Mus., vol. ii, pt. 4, p. 197.

Depth nearly equal to length of head, 2⅘–3¼ in length of body. Eye

5 (young)–7 in length of head, interorbital width 4–7. Teeth in broad bands in adult; canines small. Preopercle finely serrated, serrae slightly enlarged at angle. Gill-rakers short, 16–18 on lower part of anterior arch. D XI 13–15, 3rd or 4th spine longest. A III 8, 2nd spine about as long as 3rd. Caudal rounded. Scales mostly ctenoid in young, cycloid in adult: l.r. 110–145; l.tr. $\frac{15–20}{45–60}$; l.l. 55–70.

Length.—Up to 900 mm.

Colour.—Brown with dark spots, irregular marblings, with or without numerous small black dots, 4–5 large dark blotches along base of dorsal, and one on dorsal surface of caudal peduncle; markings very indistinct in adult, often almost uniform.

Locality.—Natal coast, Delagoa Bay.

Distribution.—Indian and Western Pacific Oceans.

Epinephelus lanceolatus (Bl.).

1790. Bloch, Ausl. Fische, vol. iv, p. 92, pl. cclxii, fig. 1.

1878–88. Day, Fish. India, pp. 18, 101, pl. iv, fig. 1.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 119 (references and synonymy).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 329 (references and synonymy).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 223.

Depth equal to length of head, $2\frac{3}{4}$–$3\frac{1}{4}$ in length of body. Eye 5 (young)–12 in length of head, interorbital width 4–$5\frac{1}{2}$, in length of head, snout very short. Teeth in broad bands in adult; canines small. Preopercle finely serrated, serrae somewhat enlarged at angle. Gill-rakers moderate, 14 on lower part of anterior arch. D XI 14–15, last spine longest. A III 8, 2nd and 3rd spines subequal. Caudal rounded. Scales cycloid or feebly ctenoid, tubes of the lateral line mostly with several diverging tubules: l.r. 100–110; l.tr. $\frac{14–15}{42–50}$; l.l. 58–67.

Length.—Up to 3600 mm. (12 ft.).

Colour.—Young, yellowish with 4 dark cross-bands, fins spotted with blackish-brown; half-grown with indistinct cross-bands, head and body with fine reticulation, spots on fins more numerous; old specimens uniform brown or blackish.

Locality.—Natal coast.

Distribution.—Indian Ocean.

Gen. Aulacocephalus T. and S..

1844. Temminck and Schlegel, Faun. Jap. Poiss., p. 15.

Body strongly compressed. Head naked and rugose above. Scales very small, strongly ctenoid, separated from each other by naked skin. Mouth large. Maxilla exposed, with supplemental bone. Teeth villiform, in bands in jaws and on vomer and palatines, but none on tongue. Preopercle serrated. Opercle with 3 strong spines. Gill-rakers long. Spinous dorsal longer than soft, latter much higher than last spines. Anal with 3 spines. Caudal truncate. Lateral line single, tubes long and straight, on the naked skin and terminating on the scales.

A single widely distributed species.

Aulacocephalus temmincki Blkr.

Yellow-stripe Rock-cod.

1844. Temminck and Schlegel, *loc. cit.*, p. 15, pl. v, fig. 2.

1857. Bleeker, Verh. Batav. Gen., vol. xxvi, p. 12.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 325 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 225.

Depth 3, length of head $2\frac{1}{2}$–$2\frac{3}{4}$, in length of body. Eye less than snout, 5–7 in length of head, about equal to interorbital width. Gill-rakers 17–18 on lower part of anterior arch. D IX 12. A III 9. Scales : l.l. 73–75. Lateral line strongly curved.

Length.—Up to 300 mm.

Colour.—Dark purplish-brown ; a yellow, black-edged stripe running along base of dorsal fin and extending through eye on to snout.

Locality.—Natal coast.

Distribution.—Japan, Siam, Mauritius.

Gen. Polyprion Cuv.

1817. Cuvier, Règne Anim., vol. ii, p. 282.

Scales small, rough, ctenoid. Mouth large. Maxilla exposed, with supplemental bone. Teeth villiform, in broad bands in jaws, on vomer, palatines, and tongue. Preopercle serrated. Opercle with a strong spine and a strong horizontal ridge. Gill-rakers long. Spinous portion of dorsal much longer than the soft, rays higher than last spines. Anal with 3 spines. Soft dorsal and anal scaly at base.

Caudal rounded or truncate. Lateral line single, tubes straight and occupying whole length of scale.

Large fishes living in rather deep water, though often ascending towards the surface. They are fond of associating in the neighbourhood of wrecks and floating timber. In the Mediterranean they are highly esteemed as food-fishes.

The only other species, *P. prognathus*, is found in the Southern Pacific Ocean, and is distinguished by a more elongate body. Though included in previous lists of South African fishes, owing apparently to a misplaced reference, there is no record of its occurrence in these waters. The specimens I have examined are all referable to the Atlantic form.

Polyprion americanus (Bl. Schn.).

Bafaro ; Stone-bass ; Wreck-fish.

1801. Bloch Schneider, Syst. Ichth., p. 205.

1892. Smitt, Skandin. Fish., vol. i, p. 47, fig. 12.

1913. Waite, Tr. N.Z. Inst., vol. xlv, p. 215, pls. v, vi.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 114 (references and synonymy).

Depth $2\frac{2}{3}$–$3\frac{1}{2}$, head about the same, in length of body. Eye $4\frac{4}{5}$–$5\frac{1}{2}$ in length of head, $1\frac{1}{3}$–$1\frac{1}{2}$ in snout and in interorbital width, the latter 3–$3\frac{1}{2}$ in length of head. Head flat above, with serrated ridges in young, which gradually become obsolete in adult ; a strong median longitudinal bony ridge on the occiput. Gill-rakers 7–8 plus rudiments on lower part of anterior arch. D XI–XII 11–12, 3rd (or 4th) to 6th (or 7th) spines longest, $2\frac{1}{2}$–$3\frac{2}{3}$ in length of head, shorter than longest soft rays. A III 9–10, 3rd spine longest. Dorsal and anal spines striated, and in the young also serrated. Pectoral about half length of head. Caudal rounded in young, truncate in adult. Scales : l.r. 105–135 ; l.tr. $\frac{15–17}{42–50}$; l.l. 78–90.

Length.—Up to 2100 mm. (7 ft.).

Colour.—Bluish-grey above, lighter on sides with a silvery sheen, belly white, fins blackish.

Locality.—Off Table Bay, Agulhas Bank, 30–150 fathoms.

Distribution.—North and Middle Atlantic, Mediterranean, New Zealand.

Local fishermen often distinguish a smaller " Yellow " Bafaro and a larger " Black " Bafaro. It seems improbable that there are two

species here, especially as the ordinary (" Black ") Bafaro is known to be much lighter in colour or blotchy in the young state.

Gen. Acanthistius Gill.

1862. Gill, Proc. Ac. Nat. Sci. Philad., p. 236.

Scales small, cycloid or ctenoid. Mouth large. Maxilla exposed, with supplemental bone. Teeth in broad villiform bands in jaws, with an outer series of enlarged canines ; teeth on vomer and palatine, none on tongue. Preopercle serrated, with strong antrorse spines on lower border. Opercle with 3 strong spines. Gill-rakers long. Spinous portion of dorsal longer than soft, the latter higher than last spines. Anal with 3 spines. Caudal rounded or truncate. Lateral line single, the tubes bi- or tri-furcate.

A genus confined to the Southern Hemisphere.

Acanthistius sebastoides (Cast.).

Orange-spotted Rock-cod.

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 3.

1881. Steindachner, S. B. Ak. Wiss. Wien, vol. lxxxiii, p. 201, pl. i.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 114 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 221.

Depth $2\frac{1}{2}$–3, length of head $2\frac{1}{3}$–3, in length of body. Eye equal to snout, $4\frac{1}{2}$–5 in length of head, a little greater than interorbital width. Lower jaw not projecting. A fringed flap on anterior nostril. Preopercle with 3 antrorse spines on lower margin. Gill-rakers 7–8 plus rudiments on lower part of anterior arch. D XII 15–16, 3rd or 4th spine longest. A III 7–8, 2nd and 3rd spines equal. Pectoral very broad, symmetrical, thick and fleshy, especially the lower rays. Caudal truncate. Scales ctenoid : l.r. 90–105 ; l.tr. $\frac{17–18}{45–50}$; l.l. 55–60. (Plate XX, fig. 3.)

Length.—Up to 300 mm.

Colour.—Brownish or reddish with darker marbling, numerous close-set small round orange dots on head and body.

Locality.—Table Bay, False Bay to East London, and Natal.

Gen. Dinoperca Blgr.

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 153.

Scales small, ctenoid. Mouth rather large. Maxilla exposed, with

supplementary bone. Teeth in villiform bands in jaws, with an outer enlarged row; teeth on vomer and palatine, none on tongue. Preopercle serrated. Opercle without conspicuous spines. Gill-rakers long. Spinous and soft portions of dorsal about equal. Anal with 3 spines. Caudal truncate or slightly emarginate. Lateral line single, tubes straight.

Indian seas and Natal.

Dinoperca queketti Blgr.

Blackfish.

1903. Boulenger, Ann. S. Afr. Mus., vol. iii, p. 63, pl. ii.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 325.

Depth $2\frac{1}{3}$–$2\frac{1}{2}$, length of head 3, in length of body. Eye equal to or slightly greater than snout, 3 (young)–4 in length of head, interorbital width $\frac{3}{4}$–$\frac{4}{5}$ diameter of eye. Serrations on preopercle coarser at angle. No fringed flap on nostrils. Gill-rakers as long as gill-fringes, 27–28 on lower part of anterior arch. D XI 17–18, 3rd–5th spines longest, 11th longer than preceding ones. A III 11–13, spines feeble, 3rd longest. Soft dorsal and anal densely scaly, high anteriorly, the posterior margins being vertical. Caudal slightly emarginate. Scales: l.r. 80–85; l.tr. $\frac{15–17}{27–30}$; l.l. 55–58.

Length.—Up to 410 mm.

Colour.—Dark brown or blackish, with irregular lines of small silvery white spots; young specimens lighter, with 4 indistinct dark oblique cross-bands.

Locality.—Natal coast.

Type in British Museum.

Gen. Rhypticus Cuv.

1829. Cuvier, Règne Anim., ed. 2, vol. ii, p. 144.

Body elongate, strongly compressed. Scales very small, cycloid, embedded in the skin. Mouth large. Maxilla exposed, with supplemental bone. Teeth in villiform bands in jaws, and on vomer and palatine; none on tongue. Preopercle and opercle each with 2–3 strong spines. Gill-rakers short. Dorsal long, the few spines short but strong. Anal without spines. Ventrals small. Pectoral rounded

Caudal rounded. All the fins thickly covered with minute scales. Lateral line single, tubes straight.

Tropical and subtropical seas.

**Rhypticus saponaceus* (Bl. Schn.).

Soap-fish.

1801. Bloch Schneider, Syst. Ichth., p. 310.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 126 (references).

1925. Meek and Hildebrand, Field Mus. Nat. Hist., zool. ser., vol. xv, pt. 2, p. 480, pl. xlvii.

Depth $2\frac{3}{5}$–3 ($3\frac{2}{3}$ in young), length of head 3–$3\frac{1}{3}$, in length of body. Eye equal to (young) or less than (adult) snout, $4\frac{1}{2}$ (young)–6 in length of head ; interorbital width $\frac{1}{2}$–$\frac{2}{3}$ diameter of eye. Lower jaw strongly projecting. Preopercle with 2–3, opercle with 3, spines. Gill-rakers 7–8 plus rudiments on lower part of anterior arch. D III 23–25, soft portion elevated and rounded behind. A 16–17. Scales : l.l. 85–90.

Length.—Up to 270 mm.

Colour.—Dark brown or purplish, with or without more or less distinct lighter spots or mottlings, fins dark.

Locality.—Cape seas.

Distribution.—Tropical and subtropical Atlantic.

A specimen in the British Museum presented by Sir A. Smith seems to be the sole record of the Soap-fish in South African seas. In the South African Museum copy of Boulenger's " Catalogue of Fishes in British Museum " there is a mark against this species (p. 348) made by Mr. P. L. Sclater when he was Director, and signifying that there was then a specimen in the Museum. This specimen, if correctly identified, has disappeared.

Gen. Grammistes Art.

1758. Artedi in Seba. Thes., vol. iii, p. 75.

Scales very small, cycloid, obtusely keeled, enveloped in the slimy coating of the epidermis. Mouth large. Maxilla exposed, with supplemental bone. Teeth in villiform bands in jaws, and on vomer and palatine ; none on tongue. Preopercle with 2–3, opercle with 3, spines. A rudimentary dermal appendage on chin. Gill-rakers short. Spinous dorsal as long, or nearly so, as soft dorsal, a deep notch between the two portions. Anal without distinct spines. Caudal rounded. Lateral line single, tubes straight.

A single Indo-Pacific species.

Grammistes sexlineatus (Thunb.).

White-lined Rock-cod.

1792. Thunberg, Vet. Ak. Handl., vol. xiii, p. 142, pl. v.

1876. Bleeker, Atl. Ichthyol., vol. vii, p. 70, pl. cccxxxvii, fig. 5 (*orientalis*).

1878–88. Day, Fish. India, p. 28, pl. ix, fig. 1 (*orientalis*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 336 (references).

Depth $2\frac{1}{2}$–$2\frac{2}{3}$, length of head $2\frac{3}{4}$–3, in length of body. Eye about equal to snout and to interorbital width, $4\frac{1}{2}$–5 in length of head. Gill-rakers 7–8 plus rudiments on lower part of anterior arch. D VI–VII 13–15. A 9–11. Scales : l.l. 63–70.

Length.—Up to 200 mm.

Colour.—Dark brown or blackish, with 3–9 white or yellowish longitudinal streaks.

Locality.—Natal coast.

Distribution.—Indo-Pacific Ocean.

The coloration, keeled scales, and slimy covering render this fish easily recognisable.

Gen. Owstonia Tanaka.

1908. Tanaka, J. Coll. Sci. Tokyo, vol. xxiii, p. 47.

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 69 (*Parasphenanthias*).

1924. *Id.*, *ibid.*, vii, p. 24 (*Owstomia* err. typ.).

Scales cycloid. Mouth very oblique. Maxilla exposed, without supplemental bone. Jaws with a single row of canine teeth, with 2 rows at symphysis of lower jaw fitting into a depression in upper. No teeth on vomer or palatines. Angle and lower margin of preopercle serrated. Spinous portion of dorsal consisting of 3 weak spines, soft portion long. Anal with 1 weak spine. Caudal elongate, lanceolate. Lateral line running along base of dorsal fin, uniting with its fellow in front of dorsal, and ending below last dorsal ray.

This genus was placed in the *Opisthognathidae* by Tanaka, in a separate family near the *Opisthognathidae* by Jordan. As Gilchrist points out, it is very closely allied to *Sphenanthias* Weber 1913, which is regarded by its author as a Serranid. *Sphenanthias* differs in having 9 dorsal spines, ctenoid scales, and the lateral lines of the two sides not confluent in front of the dorsal.

South Africa and Japan.

**Owstonia weberi* (Gilch.).

1922. Gilchrist, *loc. cit.*, p. 69, pl. x, fig. 2.

Depth 3, length of head $3\frac{1}{2}$, in length of body. Eye $2\frac{1}{3}$ in length of head. Lower margin of preopercle with strong antrorse spines concealed beneath the skin. D III 20. A I 15. Scales (according to the figure) : l.ser. about 38 ; l.tr. about 17.

Length.—Not stated.

Colour.—Uniform brilliant crimson.

Locality.—Natal coast, 180–190 fathoms.

Type in coll. Govt. Mar. Survey.

This species has a larger eye and apparently fewer scales than the Japanese species *totomiensis*, but the description is too brief for a detailed comparison.

Gen. Pseudochromis Rüpp.

1835. Rüppell, Neue Wirb. Fische, p. 8.

1915. McCulloch, Mem. Queensl. Mus., vol. iii, p. 47.

Scales moderate, ctenoid. Mouth moderate. Maxilla exposed. Teeth in a single row laterally, an outer enlarged row anteriorly in jaws ; teeth on vomer and palatine. Preopercle entire. A single dorsal with a few spines. Anal with 3 spines. Caudal rounded or truncate. Lateral line double, *i.e.* interrupted, the anterior portion running high up near the dorsal fin.

Small fishes from Indian and East Indian seas. Together with a few other genera, this genus is often included in a separate family, the *Pseudochromidae*, but in Regan's (1913) opinion there is no real justification for separating them from the *Serranidae*.

**Pseudochromis natalensis* Regan.

1916. Regan, Ann. Durban Mus., vol. i, pt. 3, p. 167.

1917. Gilchrist and Thompson, *ibid.*, vol. i, pt. 4, p. 347.

Depth of body equal to length of head, $3\frac{3}{4}$ in length of body. Eye equal to snout, 4 in length of head ; interorbital width 6 in length of head. Maxilla nearly reaching to below centre of eye. Gill-rakers 10 on lower part of anterior arch. D III 26, 3rd spine longest. A III 17, 2nd spine stronger than but about equal in length to 3rd. Caudal rounded. Scales : l.r. 48 ; l.tr. $\frac{11\frac{1}{2}}{13}$; 4–5 series on cheek.

Length.—90 mm.

Colour.—Olivaceous, back darker, snout and vertical fins blackish.

Locality.—Natal coast.

Type in British Museum.

Fam. 12. Plesiopidae.

In general similar to the *Serranidae*, but with only 2–4 rays in the ventral fin, the 1st being simply bifid and often thickened and produced. Supramaxilla present. One to four lateral lines.

A small family of Indo-Pacific-Australasian fishes.

Gen. Plesiops Cuv.

1817. Cuvier, Règne Anim., vol. ii, p. 266.

Body compressed. Scales large, ctenoid. Mouth moderate. Maxilla exposed. Teeth villiform in jaws, with slightly enlarged canines; teeth on vomer and palatines, none on tongue. Preopercle and opercle entire, without spines. Gill-rakers short. A single dorsal, membrane deeply notched between the spines, spinous portion much longer than soft. Anal short, with 3 spines. Ventral with 4 rays, 1st thickened and produced, 3rd and 4th small and slender. Caudal rounded. Two lateral lines.

Plesiops nigricans (Rüpp).

Long-fin.

1828. Rüppell, Atl. Fische Roth. Meer., p. 15, pl. iv, fig. 2.

1878–88. Day, Fish. India, p. 128, pl. xxxi, fig. 5.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 335 (references and synonymy).

Depth of body about equal to length of head, 3–3¼ in length of body. Eye 3½–4½ in length of head, snout about equal to interorbital width. Snout convex, obtuse, jaws equal. D XI–XII 6–7, spines increasing in length to last, which is nearly ½ length of head, and ½ longest soft ray. A III 6–8. Ventral with 1st ray prolonged, reaching origin of anal. Scales: upper l.l. 28–30; lower l.l. 14–16; l.tr. $\frac{2}{10\text{–}11}$.

(Plate XX, fig. 4.)

Length.—Up to 190 mm.

Colour.—Dark brown or blackish, uniform or each scale with a

bluish spot, a more or less distinct blue or black, light-edged ocellus on opercle and base of pectoral, fins dark.

Locality.—Natal coast.

Distribution.—Indo-Pacific Ocean.

Fam. 13. Kuhliidae.

Body oblong, compressed, with large ctenoid scales. Mouth large, protractile. Maxilla exposed, without supplemental bone. No subocular shelf. Teeth villiform in jaws and on palate. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae well developed. A single dorsal, notched between spinous and soft portions, the former well developed. Anal spines 3. Dorsal and anal fins in a well-developed sheath. Ventrals thoracic, with a spine and 5 rays, without axillary process. Air-bladder present. Pyloric caeca moderately numerous. Lateral line single.

Gen. Kuhlia Gill.

1861. Gill, Proc. Ac. Sci. Philad., p. 48.
1906. Fowler, *ibid.*, vol. lviii, p. 512 (*Boulengerina* non Dollo).
1912. Jordan, Proc. U.S. Nat. Mus., vol. xlii, p. 655 (*Safole*).
1913. Regan, Proc. Zool. Soc. Lond., vol. ii, p. 374 (revision).
1915. Boulenger, Cat. F.W. Fish. Afr., vol. iii, p. 92.

With the characters of the family.

An Indo-Pacific genus of small or moderate-sized fishes, some of which are frequently found entering rivers.

The limits of some of the species are difficult to define, and Boulenger and Regan are not in agreement on this matter.

Key to the South African species.

1. Scales: l.l. 40–45. Gill-rakers 16–19. Caudal with 2 dark spots (young) or a dark margin (adult) . . . . . *rupestris.*
2. Scales: l.l. 50–56. Gill-rakers 23–28.
   a. Caudal with 5 longitudinal dark bands . . . . *taeniura.*
   b. Caudal with dark posterior margin . . . . . *malo.*

Kuhlia rupestris (Lacép.).

1802. Lacépède, Hist. Nat. Poiss., vol. iv, pp. 252, 273.
1878–88. Day, Fish. India, p. 67, pl. xviii, fig. 1 (*Dules marginatus*).

1915. Boulenger, Cat. F.W. Fish. Afr., vol. iii, p. 93, fig. 76 (references and synonymy).

1917. Gilchrist and Thomson, Ann. Durban Mus., vol. i, pt. 4, p. 321 (references and synonymy).

Depth $2\frac{1}{2}$–3, length of head $2\frac{3}{4}$–$3\frac{1}{2}$, in length of body. Snout $\frac{3}{4}$–$1\frac{1}{2}$ diameter of eye, which is $3\frac{1}{4}$–$5\frac{1}{2}$ in length of head ; interorbital width 3–$3\frac{2}{3}$ in length of head. Maxilla extending to below middle of eye (young) or beyond. Gill-rakers 16–19 on lower part of anterior arch. D X 11, 4th or 5th spine longest, $\frac{1}{3}$–$\frac{2}{5}$ length of head, last spine much longer than penultimate. A III 10, base longer than its distance from caudal. Caudal emarginate. Scales : l.l. 40–45 ; l.tr. $\frac{4\text{–}6}{9\text{–}11}$. (Plate XXI, fig. 1.)

Length.—Up to 400 mm.

Colour.—Bluish or olive above, silvery below, some or all of the scales with a dark spot, soft dorsal and anal usually with one or more series of spots ; soft dorsal and each lobe of caudal in young with a dark spot, spreading to form broad marginal bands in adult, with narrow white edging.

Locality.—Natal coast.

Distribution.—Indo-Pacific.

Kuhlia taeniura (C. & V.).

Stripe-tail.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iii, p. 114.

1878–88. Day, Fish. India, p. 67, pl. xviii, fig. 2 (*Dules argenteus*).

1915. Boulenger, Cat. F.W. Fish. Afr., vol. iii, p. 95, fig. 77 (references and synonymy).

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 112 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol i, pt. 4, p. 322 (references).

Depth $2\frac{3}{4}$–3, length of head $3\frac{1}{2}$–$3\frac{2}{3}$, in length of body. Snout $\frac{2}{3}$ diameter of eye, which is $2\frac{2}{3}$–$3\frac{1}{4}$ in length of head, and equals interorbital width. Maxilla extending to below anterior margin or third of eye. Gill-rakers 23–26 on lower part of anterior arch. D X 9–11, 4th or 5th spines longest, $\frac{3}{5}$–$\frac{2}{3}$ length of head, last spine as long as or longer than penultimate. A III 10–11, base as long as, or slightly longer than, its distance from caudal. Caudal deeply forked. Scales : l.l. 50–55 ; l.tr. $\frac{5}{13\text{–}14}$.

Length.—Up to 200 mm.

Colour.—Silvery, darker on back; tip of soft dorsal black; caudal with 5 black bands, one along middle rays, and 2 pairs converging posteriorly.

Locality.—East London and Natal coast.

Distribution.—Indo-Pacific.

**Kuhlia malo* (C. & V.)

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vii, p. 479.

1915. Boulenger, Cat. F.W. Fish. Afr., vol. iii, p. 96, fig. 78 (references and synonymy).

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 111 (references and synonymy).

Depth $2\frac{1}{2}$–$3\frac{1}{4}$, length of head 3–$3\frac{2}{3}$, in length of body. Snout $\frac{1}{2}$–$\frac{2}{3}$ diameter of eye, which is $2\frac{1}{2}$–3 in length of head; interorbital width 3 in length of head. Maxilla extending to below anterior margin or fourth of eye. Gill-rakers 25–28 on lower part of anterior arch. D X 11, 4th or 5th spines longest, $\frac{1}{2}$–$\frac{2}{3}$ length of head, last spine longer than penultimate. A III 11–12, base much longer than its distance from caudal. Caudal deeply forked. Scales: l.l. 50–56; l.tr. $\frac{4\text{–}7}{14\text{–}15}$.

Length.—Up to 235 mm.

Colour.—Silvery, back darker, caudal with dark posterior edge.

Locality.—South African seas.

Distribution.—Indo-Pacific to Queensland.

A specimen in the British Museum apparently constitutes the only record for these waters. Regan identifies this specimen with his *splendens*, from the fresh waters of Rodriquez and Mauritius. Boulenger regards *splendens* as a synonym of *malo*.

Fam. 14. Priacanthidae.

Big-eyes.

Body oblong-ovate, compressed, with small rough ctenoid scales, which have the posterior border more or less thickened to form a hard plate. Mouth large, very oblique or almost vertical. Lower jaw prominent. Maxilla exposed, without supplemental bone. No subocular shelf. Teeth villiform in jaws and on palate; none on tongue. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit

behind 4th. Pseudobranchiae very large. A single dorsal fin, not notched, spinous portion rather longer than soft. Anal spines 3. Ventrals thoracic, with a spine and 5 rays, without axillary process, inner ray joined to abdomen by membrane. Air-bladder large. Pyloric caeca few. Lateral line single.

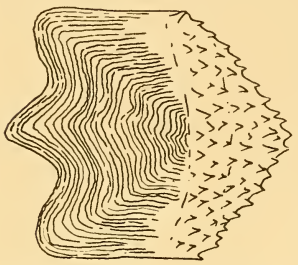


Fig. 20.—Scale of *Priacanthus arenatus.*

A small family of carnivorous fishes from tropical and subtropical seas, chiefly from deep water. Its external distinguishing features are the peculiar scales (text-fig. 20) and the large pseudobranchiae. Osteologically it is characterised by the abbreviation of the posterior part of the skull and a reduction in the number of vertebrae.

Gen. Priacanthus Cuv.

1817. Cuvier, Règne Anim., vol. ii, p. 281.

Scales very small, 70–120 in longitudinal rows. Dorsal spines increasing in length posteriorly. None of the spines in the fins very strong, often spinulose and roughened or feebly striate. Preopercle with a more or less developed spine, without a submarginal row of denticles.

Key to the South African species.

1. Tenth dorsal spine not more than twice as long as 2nd.
   - *a.* Dorsal soft rays 12–13, anal 13–14 . . . . . *cruentatus.*
   - *b.* Dorsal and anal rays 14–15 . . . . . *hamrur.*
2. Tenth dorsal spine more than twice as long as 2nd . . . *boops.*

Priacanthus cruentatus (Lacép.).

Big-eye.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 522, pl. ii, fig. 3.

1876. Bleeker, Atl. Ichthyol., vol. vii, p. 13, pl. cccli, fig. 5 (*carolinus*).

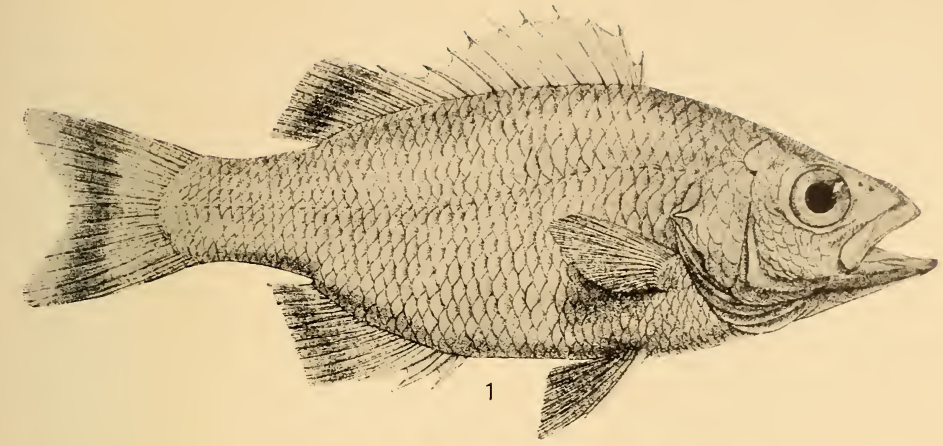
1878–88. Day, Fish. India, p. 48, pl. viii, fig. 2 (*blochii*).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 229, fig. 94.

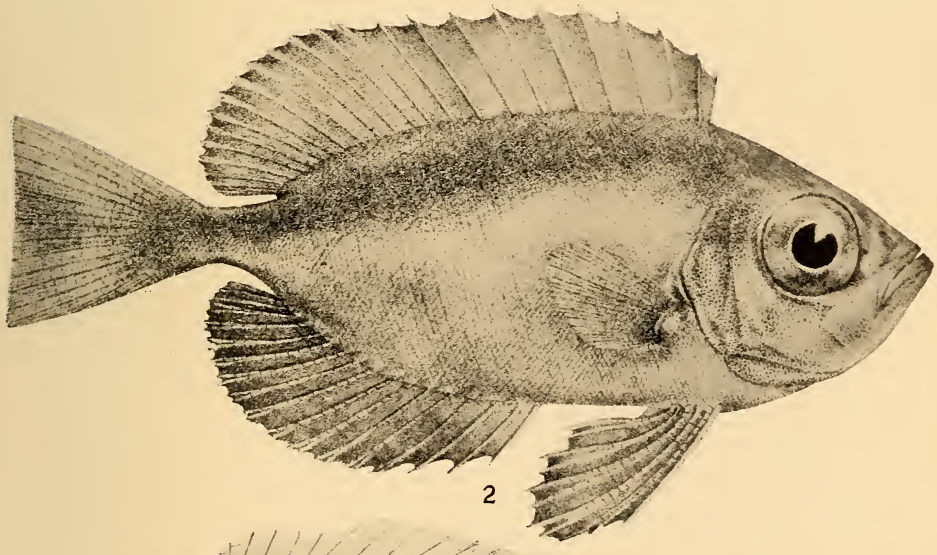
1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 337 (references and synonymy).

PLATE XXI.

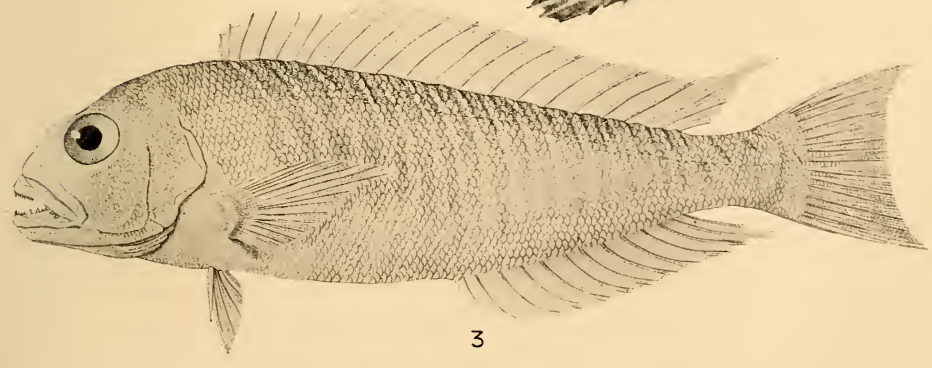
FIG.		TEXT-PAGE
1.	*Kuhlia rupestris* (Lac.) (after Day)	495
2.	*Priacanthus cruentatus* (Lac.) (after Day)	498
3.	*Branchiostegus doliatus* (C. and V.) (after Day)	502
4.	*Acanthocepola abbreviata* (C. and V.) (after Day)	503



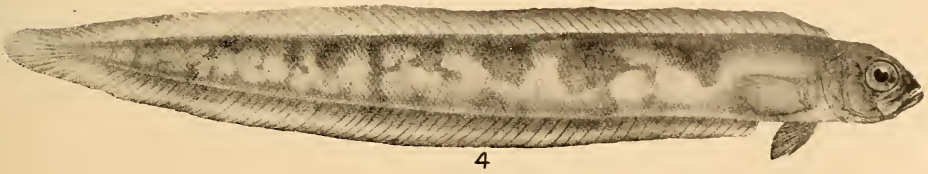
1



2



3



4

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1925. Meek and Hildebrand, Field Mus. Nat. Hist., zool. ser., vol. xv, p. 488, pl. lii.

Depth $2\frac{1}{2}$–$2\frac{3}{4}$, length of head 3–$3\frac{1}{4}$, in length of body. Snout $\frac{1}{2}$–$\frac{2}{3}$ diameter of eye, which is $2\frac{1}{5}$–$2\frac{1}{2}$ in length of head. Preopercular spine rather strong, serrated. Gill-rakers 16–18 on lower part of anterior arch. D X 12–13, last spine $1\frac{3}{5}$–2 times as long as second and $\frac{2}{5}$–$\frac{1}{2}$ length of head. A III 14. Spines rather strongly spinulose. Caudal truncate. Scales : l.l. 62–76 ; l.tr. $\frac{9\text{–}12}{48\text{–}56}$. (Plate XXI, fig. 2.)

Length.—Up to 260 mm.

Colour.—Red, silvery below, soft dorsal and anal and caudal with more or less distinct red or grey spots, back often with indistinct dark cross-bars or blotches.

Locality.—Algoa Bay, Natal coast.

Distribution.—Circumtropical.

Priacanthus hamrur (Forsk.).

1775. Forskal, Desc. Anim., p. 45.

1876. Bleeker, Atl. Ichth., vol. vii, p. 13, pl. cccliii, fig. 3.

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 355 (references and synonymy).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 148 (*arenatus* non C. and V.).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 337 (*arenatus* non C. and V.).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 12 (*alalaua* non Jord. and Everm.).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 227.

Depth $2\frac{1}{2}$–$3\frac{1}{2}$, length of head 3–$3\frac{1}{2}$, in length of body. Snout $\frac{1}{2}$–$\frac{2}{3}$ diameter of eye, which is $2\frac{1}{3}$–$2\frac{1}{2}$ in length of head. Preopercular spine strong in young, indistinct in old specimens. Gill-rakers 18–23 on lower part of anterior arch. D X 14–15, last spine $1\frac{1}{2}$–$1\frac{3}{4}$ times as long as 2nd and $\frac{1}{2}$–$\frac{3}{5}$ in length of head. A III 14–15. Spines feebly spinulose or merely striate. Caudal truncate in young, crescentic in adult, the lobes more or less produced. Scales : l.l. 75–85 ; l.tr. $\frac{9\text{–}11}{38\text{–}46}$.

Length.—Up to 360 mm.

Colour.—Red, silvery below ; soft dorsal, anal, and caudal usually (especially in young) blackish towards margins ; ventrals with black membrane, white rays.

Locality.—East London, Natal and Zululand coast, Delagoa Bay, Mozambique.

Distribution.—Indian seas to China and Japan.

**Priacanthus boops* (Forst.).

1801. Forster in Bloch Schneider, Syst. Ichth., p. 308.

1891. Sauvage, Hist. Madagasc. Poiss., pp. 119, 127, pl. xiv, fig. 1 ; pl. xvi, fig. 3 (*macropus* and *alticlarens*).

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 127 (references).

Depth $2\frac{1}{4}$–$2\frac{3}{5}$, length of head $2\frac{3}{5}$–3, in length of body. Snout $\frac{1}{2}$–$\frac{2}{3}$ diameter of eye, which is $2\frac{1}{5}$–$2\frac{2}{3}$ in length of head. Preopercular spine relatively smaller in adult than young. Gill-rakers 18 on lower part of anterior arch. D X 12–13, last spine $2\frac{1}{2}$–3 times as long as 2nd and $\frac{3}{5}$–$\frac{3}{4}$ length of head. A III 12–13. Caudal truncate. Scales : l.l. 50–66 ; l.tr. $\frac{10\text{–}12}{45\text{–}53}$.

Length.—Up to 480 mm.

Colour.—Red, silvery below, fins with narrow blackish edge, ventrals black between the rays.

Locality.—Cape of Good Hope.

Distribution. — South Atlantic, Indian, and Western Pacific Oceans.

Sir Andrew Smith's specimen in the British Museum appears to be the only record of this species from South Africa.

Fam. 15. Branchiostegidae.

Body more or less elongate, with small ctenoid scales. Mouth terminal, protractile. Maxilla exposed, without supplemental bone. Subocular shelf present. Teeth villiform in jaws, a blunt canine often present on hind end of premaxilla ; palate toothless. Nostrils paired. Gill-membranes united but free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. A single dorsal fin, spinous portion less developed than soft. Anal long, with 1 or 2 spines. Ventrals thoracic, of a spine and 5 rays, without axillary process. Air-bladder present. Pyloric caeca few or none. Lateral line single, continuous.

Moderate or large fishes from temperate and tropical seas.

To this family belongs the Tile Fish (*Lopholatilus*) of the North American coast, which was destroyed, presumably by a sudden change in temperature of the water, in vast quantities in 1882. It was believed

to have become extinct, as it was not rediscovered in its old haunts until a decade later.

Gen. Branchiostegus Raf.

1815. Rafinesque, Anal. Nat.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 368 (*Latilus*).

1925. Jordan and Hubbs, Mem. Carn. Mus., vol. x, p. 248.

Body rather elongate. Soft dorsal and anal rays in moderate number. Pectoral with middle ray longest, those below it abruptly shorter. Preopercle denticulate. No fleshy appendages on nape or lips. Pyloric caeca few.

Key to the South African species.

1. No cross-bars. Base of dorsal black. Lateral line 60–65 . . *japonicus.*
2. Numerous cross-bars. Lateral line 100–115 . . . . *doliatus.*

Branchiostegus japonicus (Hout.).

1782. Houttyn, Holl. Maats. Weet. Haarlem, vol. xx, p. 311.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 369 (*argentatus*).

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 489 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 348 (*argentatus*).

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 15.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 249 (*argentatus*).

Depth of body about equal to length of head, $3\frac{1}{2}$–4 in length of body. Eye $1\frac{1}{2}$ in snout, 4 in length of head, equal to or slightly less than interorbital width. A few canines at symphysis of jaws, at hind end of lower jaw, and one at hind end of upper jaw. Gill-rakers 11–12 on lower part of anterior arch. D VII 14. A II 11–12. Caudal subtruncate. Scales : l.l. 60–65.

Length.—Up to 600 mm.

Colour.—Crimson or rose-coloured, a black medio-longitudinal streak from interorbital to dorsal fin, membrane of dorsal black at base.

Locality.—Natal and Zululand coast, 20–60 fathoms.

Distribution.—Seas of China and Japan.

This is a common food-fish in Japan.

Fowler's description varies a little from the above, especially as regards the coloration.

Branchiostegus doliatus (C. and V.).

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 371, pl. cxxx.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 348.

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 15.

Depth $3\frac{1}{3}$–$3\frac{2}{3}$, length of head $3\frac{2}{3}$–$3\frac{4}{5}$, in length of body. Eye $2\frac{4}{5}$–3 in length of head, greater than snout, which equals interorbital width. Canine teeth at symphysis of jaw, on hind end of lower jaw, and one at hind end of upper jaw. Gill-rakers 10–11 on lower part of anterior arch. D VI 15–16. A II 12. Caudal truncate or slightly emarginate. (Plate XXI, fig. 3.)

Length.—Up to 350 mm.

Colour.—Rose-coloured, silvery, with numerous dark vertical cross-bars on upper part of body, a dark opercular spot.

Locality.—Natal coast, 50–183 fathoms.

Distribution.—Ile de France, Indian Ocean.

Fam. 16. Cepolidae.

Band-fishes.

Body very elongate, strongly compressed, with small cycloid scales. Mouth oblique, protractile. Maxilla exposed, without supplemental bone. Subocular shelf absent, or very narrow. Teeth villiform in jaws; none on palate. Nostrils paired. Gill-membranes separate, free from isthmus. Gills 4. Pseudobranchiae present. Dorsal and anal very long, without spines, confluent with the reduced caudal. Ventrals thoracic, of a spine and 5 rays, without axillary process. Air-bladder large. Pyloric caeca few. Lateral line very obscure or absent.

The Band-fishes are aberrant Serranids (Regan, 1913), perhaps most nearly related to the *Branchiostegidae* (Jordan and Fowler, 1903). They inhabit the tropical and subtropical shores of Europe and Asia, and are all of a bright red colour.

Gen. Acanthocepola Blkr.

1874. Bleeker, Versl. Ak. Amsterd., vol. viii, p. 369.

Preopercle armed with 4–8 blunt spines. Dorsal rays simple, indistinctly articulate.

**Acanthocepola limbata* (C. and V.).

Black-spotted Band-fish.

1835. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. x, p. 402 (*limbata* and *marginata*).

1854. Bleeker, Verh. Bat. Gen., vol. xxvi, p. 109 (*mesoprion*).

1888. Day, Fish. India Suppl., p. 796 (*indica*).

1889. *Id.*, Fauna Ind. Fishes, vol. ii, p. 329 (*indica*).

1902. Jordan and Evermann, Proc. U.S. Nat. Mus., vol. xxv, p. 363, fig. 26 (*mesoprion*).

1903. Jordan and Fowler, *ibid.*, vol. xxvi, p. 792, fig.

Depth of body about equal to length of head, 9–12 in length of body. Eye twice snout, $1\frac{1}{2}$ times interorbital width, $2\frac{3}{4}$–$3\frac{1}{4}$ in length of head. Preopercle with 6–8 spines. D and A very long, more than 90 rays (ca. 105). Scales very small (over 300); no lateral line.

Length.—Up to 325 mm.

Colour.—Red, uniform, an oval black spot on dorsal fin between 8th and 11th rays, anal (and sometimes also dorsal) with a narrow dark margin.

Locality.—Delagoa Bay.

Distribution.—Japan, Formosa, India.

This species is introduced into the fauna-list with some doubt. The late A. W. Baily, a well-known resident of Delagoa Bay and a keen fisherman, showed me in 1912 a specimen which had been dried as a curio. Mr. Baily assured me it had been caught in Delagoa Bay; he was unwilling to part with the specimen, and at the time I only took rough notes. On Mr. Baily's death, a few years later, inquiries failed to elicit any information as to the whereabouts of the specimen.

The presence of the preopercular spines and the black spot on the dorsal lead me to identify it with the Japanese species.

The figure on Plate XXI is that of an allied species, *A. abbreviata* C. and V., without a black spot on the dorsal fin.

Fam. 17. Hoplegnathidae.

Body oblong, moderately compressed, with very small ctenoid scales. Mouth not protractile. Maxilla not concealed. Subocular shelf present. Teeth in jaws united into a sharp trenchant edge (like the beak in the *Scaridae*), the internal flat basal portion in upper jaw with a few tubercles or granules ; none on vomer or palatines. Nostrils paired. Gill-membranes broadly united but free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. A single dorsal fin. Anal spines 3. Soft dorsal and anal scaly at their bases. Ventrals thoracic, of a spine and 5 rays, without axillary process. Caudal truncate or emarginate, scaly. Air-bladder present. Pyloric caeca few. Lateral line single.

This family contains a single genus with a few species from South Africa, Japan, Australia, and the Peruvian coast.

The relationships of this family are not very clear, though evidently there is no connection with the *Scaridae*, the peculiar parrot-like jaws being a perfectly independent development.

Contrary to Regan's statement (Ann. Mag. Nat. Hist., (8), vol. xii, p. 130, 1913) there is no free scaly process in the axil of the ventral fin ; consequently, for the sake of convenience, this family is grouped with the other families without axillary processes, but without any suggestion as to possible relationships to them.

Gen. Hoplegnathus Rich.

1840. Richardson, Proc. Zool. Soc., p. 27 (*Oplegnathus*).
1842. *Id.*, Trans. Zool. Soc., vol. iii, p. 144 (corrected spelling).
1861. Castelnau, Mem. Poiss. Afr. Austr., p. 35 (*Ichthyorhamphos*).
1900. Waite, Rec. Austr. Mus., vol. iii, p. 212.
1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, p. 76.
1916. Regan, Ann. Durban Mus., vol. i, pt. 3, p. 168.

With the characters of the family.

The genus is divided into two : *Hoplegnathus* proper, with the spinous dorsal nearly or quite twice as long as the 11–14-rayed soft portion, and interorbital space naked : *conwayi* and *woodwardi*, South Africa and Australia.

Scarostoma Kner, with the spinous dorsal slightly less than or not more than $1\frac{2}{3}$ as long as the 15–21-rayed soft portion, and interorbital space scaly : *fasciatus*, *punctatus*, *insignis*, *robinsoni*, Japan, Peru, and Natal.

It should be noted that the number of soft dorsal rays in the various species forms a continuous series from 11–21, and that the character of the opercular spine, mentioned by Regan, is unreliable.

Key to the South African species.

1. Interorbital space scaleless . . . . . *conwayi.*
2. Interorbital space scaly . . . . . *robinsoni.*

Hoplegnathus conwayi Rich.

Parrot-fish ; Pappegaai-vis ; Bastard Galjoen.

1840. Richardson, *loc. cit.*, p. 27.

1842. *Id.*, *loc. cit.*, vol. iii, p. 144, pl. vii, fig. 1.

1861. Castelnau, *loc. cit.*, p. 35 (*Ichthyorhamphos pappei*), and (?) note on p. 7 (*Scarus* sp.).

1916. Gilchrist and Thompson, Mar. Biol. Rep., vol. iii, p. 56, fig. (*algoensis*) (young).

1918. Thompson, *ibid.*, vol. iv, p. 75 (*pappei*) (references).

Depth 2 (juv.)–2⅔ (adult), length of head 2⅔ (juv.)–3½ (adult), in length of body. Eye 2½ (juv.)–5½ (adult) in length of head, in adult slightly less than snout, and 2 in interorbital width. Preopercular margin serrulate in young. Opercular spine pointed in young, pointed or more or less rounded in adult, sometimes the edge is irregularly worn, appearing to be serrate. Gill-rakers 15–17 on lower part of anterior arch. D XII 11–13(14), spinous portion nearly or quite twice as long as soft portion, middle spines longest, ⅔ length of longest rays in young, but not more than half in adult, margin of soft fin straight or somewhat concave in adult. A III 11(–12), 3rd spine longest, nearly twice shortest (last) ray in young, but scarcely longer than it in adult, soft fin similar to soft dorsal, longest ray about equal to longest dorsal ray. Ventrals reaching to vent in young, only halfway between their bases and vent in adult. Caudal slightly emarginate. Scales : l.l. 70–77 ; ca. 25–27 between l.l. and origin of dorsal. Interorbital space scaleless. Pyloric caeca 5. (Plate XXII, fig. 2.)

Length.—Up to 550 mm.

Colour.—Head and back very dark brown or bluish blackish, cheeks, breast and belly silvery, fins dark ; soft dorsal, anal, and ventrals blackish. Young (up to 150 mm.) yellow, with a dark vertical band through eye, and a broader one connecting the soft dorsal and anal ; axil of pectoral dark ; fins light, except the ventrals, the greater part of the anal, and a part of the soft dorsal, which are dark.

Locality.—False Bay, Agulhas Bank, Algoa Bay to Natal.

The type of *conwayi* originally in the Haslar collection does not appear to be in the British Museum, that of *pappei* is probably lost, and that of *algoensis* appears likewise to be lost.

That the habitat of the original specimen of *conwayi* was unknown, though considered by Richardson to be Australia, is no reason for not adopting that specific name. The South African fish agrees exactly with Richardson's description, and *conwayi* has never been found in Australia. Its place there is taken by the striped species *woodwardi.*

The food of the Parrot-fish consists of Echinoderms, Crustacea, and Gorgonia corals.

Allied species in Japan are valued as food-fishes, but in South African waters the fish is too uncommon to have any importance.

It was probably a head of this species that Castelnau saw in the South African Museum and referred to the genus *Scarus* (Castelnau, *loc. cit.*, p. 7. Note at end of systematic index).

**Hoplegnathus robinsoni* Regan.

1916. Regan, Ann. Durban Mus., vol. i, pt. 3, p. 168.

1916. Gilchrist and Thompson, *ibid.*, vol. i, pt. 4, p. 348.

Depth $1\frac{5}{7}$, length of head 3, in length of body. Eye 4 in length of head, less than snout and than interorbital width. Preopercular margin serrate. Opercular spine pointed. D XI 21, spinous portion much less than twice as long as soft portion, middle spines longest, nearly $\frac{1}{3}$ length of head, anterior soft rays much the longest, a little longer than head. A III 15, 3rd spine longest, anterior rays the longest, similar to soft dorsal. Caudal emarginate. Scales : 110 in a longitudinal series. Interorbital space scaly.

Length.—150 mm.

Colour.—Silvery, with 5 black subvertical cross-bands, the first through eye, the last at base of caudal fin, which has a black edge.

Locality.—Natal coast.

Type in British Museum.

This species, which is known only from the type, is very similar in colour-markings to the Australian *woodwardi*, and, to a lesser extent, to the Japanese *fasciatus*.

Fam. 18. Sillaginidae.

Smelts.

Body elongate, with moderate-sized ctenoid scales. Mouth small, terminal, little protractile. Maxilla concealed beneath the enlarged preorbital. Subocular shelf present. Teeth in villiform bands in jaws and on vomer. Nostrils paired. Gill-membranes united, but free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Two dorsal fins, 1st short, 2nd long. Anal similar to 2nd dorsal, with two small spines. Ventrals thoracic, of a spine and 5 rays, without axillary process. Air-bladder present. Pyloric caeca few. Lateral line single.

A small family of Indo-Pacific coastal fishes, which in Australia and Japan are of commercial value. They frequently ascend tidal rivers.

Neither the Natal name of Smelt nor the Australian name of Whiting has any reference to the European fishes of the same names.

Gen. Sillago Cuv.

1817. Cuvier, Règne Anim., ed. 1, vol. ii, p. 258.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 486.

With the characters of the family.

Four other genera have been instituted, which seem, however, scarcely worthy of full generic rank.

Key to the South African species.

1. Ventral fin with slender spine.
   - *a.* Uniform . . . . . *sihama.*
   - *b.* With blackish lateral blotches . . . . . *maculata.*
2. Ventral fin with thickened, curved spine . . . . *chondropus.*

Sillago sihama (Forsk.).

Smelt.

1775. Forskal, Desc. Anim., p. 70.

1878–88. Day, Fish. India, p. 265, pl. lvii, fig. 3.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 348 (references and synonymy).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 248.

Depth $5\frac{1}{2}$–$6\frac{1}{2}$, length of head $3\frac{1}{2}$–4, in length of body. Eye $1\frac{1}{2}$ in interorbital width, 2 in snout, 5 in length of head. Gill-rakers 7–9 plus 2–3 rudiments on lower part of anterior arch. D XI+I 20–21, 2nd spine not very elongate, about $\frac{2}{3}$ length of head. A II 23–24. Spine of the ventral fin normal, slender. Caudal emarginate. Scales : l.l. 69–70 ; l.tr. $\frac{4\text{–}5}{10\text{–}12}$. Cheek scales cycloid. (Plate XXII, fig. 1.)

Length.—Up to 300 mm.

Colour.—Olivaceous above, lighter below, with a silvery sheen.

Locality.—Durban Bay, Delagoa Bay, Chinde.

Distribution.—East coast of Africa, Indian seas to Japan.

Frequents sandy bays.

**Sillago maculata* Q. and G.

1824. Quoy and Gaimard, Voy. Uranie Zool., p. 261, pl. liii, fig. 2.

1877. Bleeker, Atl. Ichth., vol. ix, pl. ccclxxxix, fig. 5.

1878–88. Day, Fish. India, p. 265, pl. lviii, fig. 4.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 248.

Depth $5\frac{2}{5}$–$5\frac{3}{4}$, length of head $3\frac{1}{3}$–$3\frac{1}{2}$, in length of body. Eye $2\frac{3}{4}$ (Day), $3\frac{3}{4}$–4 (Fowler) in length of head, $1\frac{1}{2}$–$1\frac{3}{4}$ in snout. Gill-rakers 10 on lower part of anterior arch. D X–XI+I 19–21, 2nd spine rather less than $\frac{1}{2}$ length of head, 3rd–5th subequal to one another. A II 20–23. Caudal emarginate. Scales : l.l. 70–72 ; l.tr. $\frac{6}{9\text{–}10}$.

Length.—Up to 300 mm.

Colour.—Greyish above, white below, with a silvery lateral band and irregular dark blotches along side ; upper half of 1st dorsal blackish, 2nd dorsal and anal greyish along margins.

Locality.—Delagoa Bay.

Distribution.—Indian seas, East Indies, to S.E. Australia.

Frequents sandy bays and estuaries.

S. aeolus J. and E. 1902 from Formosa appears to be closely allied.

Sillago chondropus Blkr.

1849. Bleeker, Verh. Bat. Gen., vol. xxii, p. 61.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 348 (references).

Depth $5\frac{3}{4}$–$6\frac{1}{4}$, length of head 4–$4\frac{1}{3}$, in length of body. Eye $1\frac{1}{2}$ in interorbital width, $2\frac{1}{2}$ in snout, $6\frac{1}{2}$–7 in length of head. Gill-rakers 7

plus 2–3 rudiments on lower part of anterior arch. D XI+I 20–21, 2nd spine not very elongate, about ½ length of head. A II 22–23. Spine of the ventral fin shortened and much thickened, curved. Caudal emarginate. Scales : l.l. 70 ; l.tr. $\frac{5}{11–12}$. Cheek scales ctenoid.

Length.—Up to 350 mm.

Colour.—Uniform light greenish-brown above, lighter below, with a silvery sheen.

Locality.—Natal coast.

Distribution.—East Indian Archipelago.

Fam. 19. Pomatomidae.

Body oblong, compressed, with moderate-sized cycloid scales. Mouth large, oblique. Maxilla exposed, with supplemental bone. A subocular shelf. Preopercle with a membranous flap produced over the subopercle. A single series of strong canine teeth in each jaw ; an inner series of small depressed teeth in upper jaw ; villiform teeth on vomer, palatines, and tongue. Nostrils paired. Gill-membranes separate, free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Two dorsal fins, the 1st of about 8 weak, low spines, depressible in a groove ; 2nd dorsal similar to anal, elongate, both scaly. Anal spines 1–2, very small and often hidden in skin. Ventrals thoracic, of a spine and 5 rays, without axillary process. Air-bladder present. Pyloric caeca very numerous.

A single species found in nearly all warm seas and known by various names : Bluefish, Skipjack, etc.

Gen. Pomatomus (Lacép).

1802. Lacépède, Hist. Nat. Poiss., vol. iv, p. 436.

With the characters given above. Preopercle slightly notched above angle, lower margin finely serrated.

Pomatomus saltator (Linn.).

Elft (Cape) ; *Shad* (Natal).

1758. Linné, Syst. Nat., ed. 10, vol. i, p. 293.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 225, pl. cclx.

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 41 (*Temnodon conidens*).

1916. Thompson, Mar. Biol. Rep., vol. iii, pp. 128, 129 (references and synonymy).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 338 (references and synonymy).

1919. Fowler, Proc. U.S. Nat. Mus., 56, p. 291.

1921. Waite, Rec. S. Austr. Mus., vol. ii, p. 103, fig. 159.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 25 (references and synonymy).

Depth $3\frac{1}{2}$–4, length of head $3\frac{1}{3}$–$3\frac{1}{2}$, in length of body. Eye equal to snout and to interorbital in young, twice in these distances in adult, 4 (young)–7 in length of head. Maxilla reaching to below posterior third of eye in young, beyond hind margin of eye in adult. Gill-rakers 10 on lower part of anterior arch. D VII–VIII+I 24–26. A II 26–28, 1st spine very small, often concealed. Scales : l.l. 90–100 ; l.tr. $\frac{8}{19\text{–}20}$. (Plate XXII, fig. 3.)

Length.—Up to 1000 mm.

Colour.—Silvery, bluish or greenish above, a blackish blotch at base of pectoral.

Locality.—Port Nolloth and Table Bay (occasional), False Bay to Natal coast, Delagoa Bay.

Distribution.—Nearly all temperate and tropical seas.

The habits of the Elft are not too well known. The eggs are pelagic and it seems probable that the spawning grounds lie in the deeper offshore waters. The young migrate inshore and appear in immense shoals. On the East coast of America they appear in early summer and follow the shoals of menhaden (one of the *Clupeidae*) northwards. At the Cape they appear at the same season (September–November) in the shoal waters of False Bay. Later in the season (December–March) the adults appear, and at the same time the younger fish seem to disappear. At Delagoa Bay I have seen large Elft caught in October.

The Elft caught in Table Bay have probably been over-carried round the Cape Point in pursuit of their prey. Those appearing at Port Nolloth, however, are more likely stragglers from Atlantic shoals further to the north. I have no records of its occurrence from Walfish Bay or other localities on the coast of South West Africa, though Pellegrin (1914, Ann. Inst. Oc., vol. vi, pt. 4, p. 68) records it from Praya Amélia in Angola.

Its food appears to be chiefly mackerel, maasbankers, sardines,

harders; and at certain seasons young pelagic cuttle-fish (*Loligo*). The Port Nolloth captures are recorded as feeding chiefly on Pipe-fish.

An interesting account of the Elft, from the angling point of view, was published by Mr. C. L. Biden, in "Sporting World and Outdoor Life," vol i, No. 2, pp. 16, 17; No. 3, p. 43; No. 4, pp. 34, 35, Cape Town, 1922, from which several of the facts given above are taken.

Fam. 20. Rhachicentridae.

1909, Regan, Ann. Mag. Nat. Hist., (8), vol. iii, p. 68.

Body elongate, subcylindrical, with very small smooth scales. Head broad, depressed. Mouth large, slightly protractile. Maxilla expanded posteriorly. No suborbital shelf. Teeth villiform, in bands in jaws and on vomer, palatine, and tongue. Nostrils paired. Gills 4, a slit behind 4th. Pseudobranchiae present. Spinous dorsal of 8 low, equal, separate and depressible spines. Soft dorsal and anal rather long. Anal spines 2, weak. Ventrals thoracic, of a spine and 5 rays, without axillary process. Air-bladder absent. Pyloric caeca branched. Lateral line single.

A single genus and species.

Gen. Rhachycentrum Kaup.

1826. Kaup, Isis, vol. xix, p. 89 (*Rachycentron*).

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 328 (*Elacate*).

1896. Jordan and Evermann, Fish. Mid. and N. Amer., vol. i, p. 948 (*Rachycentron*).

With the above characters.

**Rhachycentrum canadus* (Linn.).

1766. Linné, Syst. Nat., ed. 12, p. 491.

1878–88. Day, Fish. India, p. 256, pl. lv, fig. 2 (*Elacate nigra*).

1896. Jordan and Evermann, Fish. Mid. and N. Amer., vol. i, p. 948 (references).

1920. Robinson, Rep. Nat. Fish., 1919, p. 48 (*Elacate nigra: Prodigal Son*).

Depth about 7, length of head about $3\frac{3}{4}$–4, in length of body. Eye about 9 in length of head. Maxilla extending to below anterior margin of eye. Lower jaw projecting. D VIII+I 26–35. A II 25–29.

Pectoral somewhat falcate. Caudal rounded in young, then obliquely truncate and in adult emarginate. (Plate XXVII, fig. 4.)

Length.—Up to 1500 mm. (5 ft.).

Colour.—Brownish, silvery below, a dark longitudinal stripe along base of dorsal and another along side ; fins dark, with blackish edges ; edges of caudal lobes whitish.

Distribution.—Tropical parts of Atlantic, Indian seas to Japan.

This species is included here solely for the sake of comparison. Mr. R. Robinson's identification is probably erroneous, as there is another fish, *Elagatis bipinnulatus* (p. 562), which bears the same colloquial name " Prodigal Son," and the generic name (*Elacate*) might easily be confounded with *Elagatis*.

Fam. 21. Apogonidae.

Cardinal Fishes.

Body oblong or elongate, with rather large cycloid or ctenoid scales. Mouth large, oblique, protractile. Maxilla exposed. Subocular shelf present or absent. Teeth villiform in jaws, and on vomer and palatines; canines sometimes present in jaws. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Two dorsal fins (sometimes almost contiguous at base), spinous dorsal with 5–9 spines. Anal fin short, with 2 or 3–4 spines. Ventral fins thoracic, of a spine and 5 rays, without axillary process. Air-bladder present. Pyloric caeca few or moderately numerous. Lateral line single.

Small or moderate-sized fishes, chiefly from the Indo-Pacific region ; some are found in fresh waters and others are deep-water forms.

As there is considerable divergence of opinion as to the systematic position of *Scombrops*, *Acropoma*, and allied forms, I have included them in the present family, following Jordan and Snyder (1901). Regan (1913) places *Acropoma* in the *Serranidae*, *Scombrops* in the *Pomatomidae*. Jordan (1923) makes separate families of the *Scombropidae* and *Acropomatidae*. The value of the anterior position of the vent as a character in *Acropoma* is lessened by Radcliffe's (1912) discovery of certain species of *Chilodipterus* (*Paramia*) showing intergradations between the two extremes.

The name of the family should be as above, because *Apogon* has page precedence over *Chilodipterus*.

Oral gestation occurs in several species of *Apogon* and *Chilodipterus* (*vide infra*).

Key to the South African genera.

I. Vent normal in position (not far in front of origin of anal fin).
  A. Anal spines 2. Soft dorsal and anal short (*Chilodipterinae*).
    1. No canines in jaws.
      a. Palatines with teeth. Preopercle with a double ridge *Apogon*.
      b. Palatines toothless. Preopercle without a double ridge *Epigonus*.
      c. All teeth absent . . . . . *Parahynnodus*.
    2. Canines in jaws.
      a. First dorsal with 6 spines . . . . *Chilodipterus*.
      b. First dorsal with 9 spines . . . . . *Synagrops*.
  B. Anal spines 3–4. Soft dorsal and anal rather long (*Scombropinae*).
    1. Canines in upper jaw. Vertical fins scaly . . *Scombrops*.
    2. Only a pair of canines at symphysis. Vertical fins scaleless *Neoscombrops*.
II. Vent far in front of anal fin, between the ventrals (*Acropomatinae*) *Acropoma*.

Gen. Apogon Lacép.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 411.

1901. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiii, p. 894.

1918. Fage, Dan. Ocean. Exp., vol. ii, A 3, p. 37 (post-larval stages).

Body oblong, with large ctenoid scales. Villiform teeth on jaws, vomer, and palatines; no canines. Preopercle with a double ridge, *i.e.* a submarginal ridge as well as the margin, the latter sometimes serrate in the young. Soft dorsal and anal short. Anal with 2 spines. Vent close in front of anal.

Numerous species in warm seas, mostly brightly coloured, the colour and markings often being a valuable aid to identification.

In several species the male has been observed to carry the eggs in the mouth until they hatch.

Key to the South African species.

I. First dorsal with 6 spines.
  A. Anal with less than 10 soft rays.
    1. Depth of body not more than twice in length . . *nigripes*.
    2. Depth more than twice in length.
      a. Dark band from eye to pectoral . . . . *warreni*.
      b. Dark band from eye to upper margin of opercle, above pectoral *sangiensis*.
  B Anal with more than 10 rays.
    1. Without cross-bars . . . . . *macropterus*.
    2. With cross-bars . . . . . *lineolatus*.

II. First dorsal with 7 spines (1st often very small).
  A. Caudal rounded . . . . . *queketti.*
  B. Caudal emarginate.
    1. Without longitudinal or transverse markings . *monochrous.*
    2. With longitudinal stripes.
      a. Lateral line 23–28.
        i. One stripe on each side.
          α. Shallower. Second dorsal with a dark bar *frenatus.*
          β. Deeper. Second dorsal with rows of spots *kallopterus.*
        ii. Two stripes on each side . . . *quadrifasciatus.*
        iii. Five to six stripes on each side . . *melanotaenia.*
      b. Lateral line 36–39. Seventeen stripes . . . *natalensis.*
    3. With transverse bands.
      a. One band on caudal peduncle . . . . *aureus.*
      b. One band from each dorsal fin . . . . *bifasciatus.*
      c. Three bands and ocellus above pectoral fin . . *duops.*

A. fasciatus (White) has been recorded from Mozambique (Peters, Wieg. Arch., 1855, p. 234), but as several forms have been included under this name and as the synonymy of these longitudinally banded forms is in a state of considerable confusion, it seems best not to include it in the actual fauna-list. The true *fasciatus* (White) is a New South Wales fish.

A. roseus Fischer (1885, Jahrb. Hamb. Wiss. Aust., vol. ii, p. 66) from Mozambique is not an *Apogon* but an *Ambassis* (see p. 644).

Apogon nigripes Playf.

Black-fin Cardinal-fish.

1866. Playfair and Günther, Fish. Zanz., p. 19, pl. v, fig. 1.

Depth at least $\frac{1}{2}$ length of body, length of head $2\frac{1}{2}$ in length of body. Eye $2\frac{1}{2}$–$2\frac{2}{3}$ in length of head. Lower jaw projecting. Preopercle finely serrated on margin and submarginal ridge. Suprascapula serrated. D VI+I 8, 1st spine short, 2nd strong, equal to length of head without snout. A II 8. Ventrals with the first 2 or 3 rays elongate, reaching to middle of anal. Caudal emarginate. Scales : l.l. 22–23.

Length.—Up to 115 mm.

Colour.—Yellowish, with silvery cross-bands, 1st dorsal, anterior part of 2nd dorsal and anal, and upper and lower lobes of caudal dusky, ventrals blackish.

Locality.—Mozambique.

Distribution.—Zanzibar.

I found this species fairly common at Mozambique. It is easily distinguished from all other South African species by its deep body and the long dark ventral fins.

**Apogon warreni* Regan.

Warren's Cardinal-fish.

1908. Regan, Ann. Nat. Mus., vol. i, pt. 3, p. 251, pl. xlii.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 341.

Depth of body equal to length of head, $2\frac{3}{4}$ in length of body. Eye $3\frac{1}{5}$ in length of head. Lower jaw shorter than upper. Preopercle ? D VI+I 9, 1st spine short, 2nd much stronger and a little longer than 3rd. A II 8. Caudal emarginate. Scales : l.l. 25.

Length.—50 mm.

Colour.—A dark band from eye to base of pectoral and an elongate dark spot on caudal peduncle.

Locality.—Kosi Bay, Zululand.

Type in British Museum.

Very closely allied to the following species, *sangiensis*, but differing in the position of the dark band on the head.

**Apogon sangiensis* Blkr.

1856. Bleeker, Nat. Tyds. Ned. Ind., vol. xii, p. 375.

1876. *Id.*, Atlas Ichthyol., vol. vii, p. 95, pl. cccxix, fig. 4.

1878–88. Day, Fish. India, p. 64, pl. xvii, fig. 3.

1913. Weber, Siboga Exp. Monogr., 57, p. 229.

1919. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 458.

Depth of body equal to length of head, $2\frac{3}{4}$ in length of body. Eye 3 in length of head. Jaws equal. Outer edge of preopercle very finely serrated. D VI+I 9, 1st spine short, 2nd stronger but a little shorter than 3rd. A II 8–9. Caudal emarginate. Scales : l.l. 24–25.

Length.—Up to 85 mm.

Colour.—Golden, a dark band from snout through eye to upper edge of opercle (*above* base of pectoral), a dark spot on base of caudal fin, upper margin of 1st dorsal black, anal more or less spotted with blue.

Locality.—Natal coast.

Distribution.—Indian seas, East Indies.

Apogon macropterus C. and V.

Orange-spotted Cardinal-fish.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 160.

1852. Bleeker, Nat. Tyds. Ned. Ind., vol. iii, p. 724 (*macropteroides*).

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 245 (*bleekeri*).

1876. Bleeker, Atl. Ichthyol., vol. vii, p. 103, pl. cccxlvi, fig. 2 (synonymy).

1878–88. Day, Fish. India, p. 64, pl. xvii, fig. 4 (synonymy).

1891. Sauvage, Hist. Nat. Madagas. Poiss., p. 141.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321.

Depth of body equal to length of head, $2\frac{2}{3}$–$2\frac{3}{4}$ in length of body. Eye $2\frac{7}{8}$–3 in length of head. Lower jaw slightly projecting. Angle of preopercle serrate, inner ridge rectangular, with a small projecting point. D VI+I 9, 2nd and 3rd spines about equal, 2nd not very stout. A II 14–17. Caudal emarginate. Scales : l.l. 23–25.

Length.—Up to 100 mm.

Colour.—Silvery white, with a pinkish tinge, with or without a series of orange spots along side ; fins pinkish, usually a black spot at base of caudal fin.

Locality.—Natal coast, Mozambique.

Distribution.—Indian seas, East Indies.

Specimens from Natal have the 1st dorsal spine scarcely less than the 2nd in length, whereas those from Mozambique agree more with Bleeker's figure in having the 1st spine only $\frac{1}{4}$–$\frac{1}{3}$ as long as the 2nd. The Mozambique specimens were coloured like Playfair and Günther's var. b. (Fish. Zanzibar, p. 21).

One of the Mozambique specimens, 75 mm. in length, has the mouth full of eggs.

**Apogon lineolatus* C. and V.

Barred Cardinal-fish.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 160.

1828. Rüppell, Atl. Fische, p. 47, pl. xii, fig. 1.

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 244.

1870. Klunzinger, Verh. k.k. Zool. Bot. Ges. Wien, vol. xx, p. 710.

1921. Brit. Mus. Rep., p. 118 (Delagoa Bay).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 219.

Depth 3, length of head $3\frac{1}{4}$, in length of body. Eye $2\frac{1}{2}$ in length of head. Lower jaw slightly projecting. Outer margin of preopercle

serrate, inner ridge subquadrate. D VI+I 9, 2nd spine twice 1st, not longer than 3rd. A II 14. Caudal emarginate. Scales : 26.

Length.—Up to 75 mm.

Colour.—Yellowish or reddish silvery, 12–13 darker narrow cross-bars, a black spot at base of caudal fin; fins pinkish, 2 blue horizontal stripes through eye.

Locality.—Delagoa Bay.

Distribution.—Red Sea.

Apogon queketti Gilch.

Quekett's Cardinal-fish.

1903. Gilchrist, Mar. Invest. S. Afr., vol. ii, p. 206, pl. xiv.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 340.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 13.

Depth $2\frac{2}{3}$–3, length of head $2\frac{1}{2}$–$2\frac{2}{3}$, in length of body. Eye $3\frac{3}{4}$–4 in length of head. Jaws about equal, or lower slightly projecting. Preopercle with both margins entire in young and adult, but in latter outer margin has 4 more or less distinct crenulations on the rounded angle. D VII+I 8, spines graduated to 4th, which is longest. A II 8. Caudal rounded. Scales : l.l. 25–26. (Plate XXIV, fig. 5.)

Length.—Up to 100 mm.

Colour.—About 7 longitudinal lines of dark spots, 3 dark cross-bands, most marked in young, across the caudal peduncle, a dark vertical band from lower margin of eye, a black patch on 1st dorsal between 4th and 6th spines; 2nd dorsal, anal, and caudal with dark margins.

A young specimen is brown, without any trace of dark spots or bands, but with the black spot on 1st dorsal, and the pectoral speckled.

Locality.—Natal and Zululand coast, down to 42 fathoms.

Type in South African Museum.

This is the only species of *Apogon* in these waters which has a rounded caudal fin. This feature and the spot on the 1st dorsal renders it easily identified.

Apogon monochrous Blkr.

Plain Cardinal-fish.

1856. Bleeker, Act. Soc. Sc. Indo-Neerl., vol. i, p. 34.

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 236.

1916. Regan, Ann. Durban Mus., vol. i, pt. 3, p. 168.

1917. Gilchrist and Thompson, *ibid.*, vol. i, pt. 4, p. 340.

Depth $2\frac{1}{2}$, length of head $2\frac{3}{4}$, in length of body. Eye 3 in length of head. Jaws about equal. Outer edge of preopercle and suprascapula serrated. D VII+I 9–10, 1st spine very short, 2nd half 3rd, which is longest and strongest. A II 8–9. Caudal emarginate. Scales: l.l. 27.

Length.—Up to 115 mm.

Colour.—Golden, minutely dotted with brown, fins darker.

Locality.—Natal coast.

Distribution.—East Indies, Fiji Islands.

Günther (Fische d. Südsee, vol. i, p. 22) considers that this species is synonymous with the earlier *fuscus* of Quoy and Gaimard (Voy. Freyc. Zool., p. 345).

Apogon frenatus Val.

One-stripe Cardinal-fish.

1832. Valenciennes, Nouv. Arch. Mus., p. 57, pl. iv, fig. 4.

1833. Bennett, Proc. Zool. Soc., p. 32 (*vittiger*).

1873. Günther, Fische d. Südsee, vol. i, p. 19, pl. xix, fig. A.

1876. Bleeker, Atl. Ichthyol., vol. vii, p. 89, pl. cccxlii, fig. 2.

1878–88. Day, Fish. India, p. 58, pl. xvi, fig. 4.

1908. Regan, Tr. Linn. Soc. Lond., 2nd ser. Zool., vol. xii, pt. 3, p. 225 (*vittiger*).

1913. Weber, Siboga Exp. Monogr., 57, p. 227.

Depth 3–$3\frac{1}{3}$, length of head $2\frac{1}{2}$–$2\frac{2}{3}$, in length of body. Eye 3 in length of head. Jaws equal. Outer edge and inner ridge of preopercle, suborbital, and suprascapula serrate. D VII+I 9–10, 1st spine very short, 2nd half length of 3rd, which is longest, and about half length of head. A II 8. Caudal emarginate. Scales: l.l. 25 (Günther gives 27–28).

Length.—Up to 100 mm.

Colour.—Yellowish or reddish, a dark longitudinal band from snout to caudal peduncle, ending in a dark spot at base of caudal fin, margined above and sometimes also below by a more or less distinct pale band, 1st dorsal blackish in front, a dark band along base of 2nd dorsal and of anal, and along upper and lower margins of caudal.

Locality.—Natal coast, Mozambique.

Distribution.—Mauritius, Indian seas, East Indies, New Guinea.

**Apogon kallopterus* Blkr.

1856. Bleeker, Act. Soc. Sc. Indo-Neerl., vol. i, p. 33.
1876. *Id.*, Atl. Ichthyol., vol. vii, p. 89, pl. cccxxxvii, fig. 2.
1916. Regan, Ann. Durban Mus., vol. i, pt. 3, p. 168.
1917. Gilchrist and Thompson, *ibid.*, vol. i, pt. 4, p. 340.

Very similar to the preceding species but: depth $2\frac{3}{4}$ in length of body, 2nd dorsal not higher than 1st, 1st dorsal with dark vertical bars, 2nd dorsal with several rows of dark spots.

Locality.—Natal coast.

Distribution.—East Indies.

It seems very doubtful whether this form is specifically distinct from *frenatus*.

**Apogon quadrifasciatus* C. and V.

Two-stripe Cardinal-fish.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 153.
1876. Bleeker, Atl. Ichthyol., vol. vii, p. 88, pl. cccxxxv, fig. 1.
1878–88. Day, Fish. India, p. 59.
1913. Weber, Siboga Exp. Monogr., 57, p. 226.

(Non Jordan and Snyder, 1900, Proc. U.S. Nat. Mus., vol. xxiii, p. 353).

Depth of body about equal to length of head, $2\frac{3}{4}$ in length of body. Eye $2\frac{3}{4}$–$3\frac{1}{4}$ in length of head. Lower jaw slightly projecting. Preopercular margin serrate, inner ridge entire. Suprascapula serrate. D VII+I 9, 1st spine very short, 2nd about $\frac{1}{3}$ length of 3rd, which about equals 4th. A II 8. Caudal emarginate. Scales: l.l. 25–26.

Length.—Up to 105 mm.

Colour.—Yellowish, with 2 dark longitudinal bands, the lower from snout through eye to caudal fin, the upper from eye to upper part of caudal peduncle, no median band from interorbital to origin of dorsal, a faint dark band along base of 2nd dorsal and anal fins.

Locality.—Mozambique.

Distribution.—Indian seas, East Indies.

Apogon melanotaenia Regan.

Five-stripe Cardinal-fish.

1905. Regan, J. Bomb. Nat. Hist. Soc., vol. xvi, p. 320, pl. C, fig. 4.
1917. *Id.*, Ann. Durban Mus., vol. i, pt. 5, p. 458.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 13.

Depth $2\frac{2}{3}$–3, length of head $2\frac{3}{4}$, in length of body. Eye $2\frac{3}{4}$–3 in length of head. Lower jaw shorter than upper. Suprascapula and outer edge of preopercle serrate. D VII+I 9, 1st spine very short, 2nd half length of 3rd, which is longest. A II 8. Caudal emarginate. Scales : l.l. 23–25.

Length.—Up to 80 mm.

Colour.—Yellowish, with 5–6 black longitudinal stripes ; 1st begins as a median stripe on interorbital, divides and runs along base of dorsal fins, uniting again on caudal peduncle ; 2nd from above eye to upper part of base of caudal ; 3rd from eye to middle of base of caudal, where it ends in a spot ; 4th from snout through pectoral to lower part of base of caudal ; 5th (often very faint) from lower jaw to anal ; sometimes a faint additional stripe between the 2nd and 3rd extending to below 2nd dorsal ; a dark band on base of 2nd dorsal and anal.

Locality.—Natal coast, 0–33 fathoms.

Distribution.—Zanzibar, Nicobars, Mekran, and Kurrachee.

Apogon natalensis G. and T.

Natal Cardinal-fish.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 149.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 340.

1919. Regan, *ibid.*, vol. ii, pt. 4, p. 197, fig. 1 (*polylepis*).

Depth $2\frac{2}{5}$–$2\frac{3}{5}$, length of head $2\frac{2}{3}$–3, in length of body. Eye equal to snout, $3\frac{2}{3}$–4 in length of head. Jaws equal. Preopercular edge very finely serrate, the ridge entire or (smaller specimen) very finely serrate. Suprascapula very finely serrate. D VII–VIII+I 9–10, 1st spine very short, 2nd about half length of 3rd, which is subequal to 4th. A II 8–9. Caudal emarginate. Scales : l.l. 36–39 ; l.tr. $\frac{4–5}{14}$.

Length.—Up to 190 mm.

Colour.—Brownish, with about 17 longitudinal dark stripes, 1st dorsal black, a black spot at base of pectoral, margins of 2nd dorsal and anal more or less dusky.

Locality.—Natal coast.

Distribution.—Kurrachee.

Type in South African Museum ; of *polylepis* in British Museum.

A. polylepis is clearly a synonym. The type has 5 scales between

spinous dorsal and lateral line, not 4 as in the original description. The species is closely allied to *noordzieki* and *multitaeniatus*.

Apogon aureus (Lacép.).

Annulate Cardinal-fish.

1802. Lacépède, Hist. Nat. Poiss, vol. iv, pp. 253, 273.

1828. Rüppell, Atl. Fische Roth. Meer., p. 48 (*annularis*).

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iii, p. 490; 1830, vol. vi, p. 553 (*roseipinnis*).

1876. Bleeker, Atl. Ichthyol., vol. vii, p. 92, pl. cccxxxvii, fig. 1.

1878–88. Day, Fish. India, p. 61, pl. xvi, fig. 8.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 142.

1913. Weber, Siboga Exp. Monogr., 57, p. 228.

1916. Regan, Ann. Durban Mus., vol. i, pt. 3, p. 168 (*annularis*).

1917. Gilchrist and Thompson, *ibid.*, vol. i, pt. 4, p. 340 (*annularis*).

Depth of body about equal to length of head, $2\frac{1}{2}$ in length of body. Eye $2\frac{1}{2}$–3 in length of head. Lower jaw very slightly projecting. Outer edge of preopercle serrate. D VII+I 9, 1st spine very short, 2nd about half length of 3rd, which is about equal to 4th. A II 8. Caudal emarginate. Scales: l.l. 25–27.

Length.—Up to 150 mm.

Colour.—Rosy or golden, a broad dark band round the caudal peduncle at base of caudal fin, sometimes a blue stripe through eye across opercle, 1st dorsal tipped with blackish, 2nd dorsal and anal with narrow dark margins, in var. *roseipinnis* C. and V. a violet band along base of anal.

Locality.—Natal coast, Mozambique.

Distribution.—Indian seas, East Indies.

Easily distinguished from all other South African species by the annular band on the tail. *A. menesema* Jenkins appears to be closely allied (see Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 215, pl. xiii, and fig. 86, 1905).

Ostorhinchus fleurieu Lacép. and *Dipterodon hexacanthus* Lacép. cannot be included in the synonymy of this species, as the descriptions of the dentition are not those of an *Apogon* at all.

**Apogon bifasciatus* Rüpp.

Two-banded Cardinal-fish.

1835. Rüppell, Neue Wirbelt. Fische, p. 86, pl. xxii, fig. 2.

1876. Bleeker, Atl. Ichthyol., vol. vii, p. 81.

1878–88. Day, Fish. India, p. 62, pl. xvi, fig. 9.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 143.

1919. Regan, Ann. Durban Mus., vol. ii, p. 197.

Depth $2\frac{1}{2}$–$2\frac{3}{4}$, length of head $2\frac{1}{3}$, in length of body. Eye 3 in length of head. Lower jaw slightly projecting. Outer edge and inner ridge of preopercle finely serrate. D VII+I 9, 1st spine very short, 2nd $\frac{1}{3}$ length of 3rd, which is longest. A II 8. Caudal emarginate. Scales : l.l. 25 (27–28).

Length.—Up to 165 mm.

Colour.—Silvery or bronzy, a dark vertical cross-bar from 1st dorsal to middle of side, a similar one from 2nd dorsal, a black spot at base of caudal fin, 1st dorsal and anal blackish, a dark bar along base of 2nd dorsal.

Locality.—Natal coast.

Distribution.—Indian seas to China.

**Apogon duops* nom. nov.

Ocellate Cardinal-fish.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 14, pl. i, fig. 2 (*Amia ocellata* nom. preocc., Weber, 1913).

Depth of body about equal to length of head, $2\frac{1}{2}$ in length of body. Eye 3 in length of head according to figure (text says 7, which is clearly an error). Jaws about equal. Outer border of preopercle serrate. D VII+I 9, 1st spine short, 2nd $\frac{1}{2}$ length of 3rd, which is longest. A II 8. Caudal emarginate. Scales : l.l. 24.

Length.—80 mm.

Colour.—Yellowish, 3 black vertical cross-bands ; 1st and 2nd from the two dorsals respectively, the 3rd on middle of caudal peduncle ; a purple, white-edged ocellus in 1st band between lateral line and axil of pectoral ; dorsals, anal, and ventrals blackish ; pectorals and caudal yellowish.

Locality.—Natal coast, 27 fathoms.

Type in coll. Govt. Marine Survey.

Very close to, if not merely a variety of, *uninotata* S. and R. (1912, Proc. U.S. Nat. Mus., vol. xli, p. 436, pl. xxxiv, fig. 3) from the Philippines. The preopercular margin is stated to be entire in *uninotata*, but that seems to be the only structural difference. The presence or absence of dark bands can well be merely a varietal character.

The new specific name is in allusion to the two " eyes," one on each side.

PLATE XXII.

FIG.		TEXT-PAGE
1.	*Sillago sihama* (Forsk.) (after Day)	507
2.	*Hoplegnathus conwayi* Rich. (original photo)	505
3.	*Pomatomus saltator* (Linn.) (after C. and V.)	509
4.	*Parahynnodus robustus* n.g. et sp. (original)	525



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Gen. Epigonus Raf.

1810. Rafinesque, Appendice, p. 64.

1895. Goode and Bean, Ocean. Ichth., p. 232.

Body rather elongate, with moderate-sized, deciduous, cycloid scales. Villiform teeth on jaws, present or absent on vomer, palatines, and tongue, but typically present on vomer and palatine in adult. Preopercle without submarginal ridge, angle broadly rounded. Opercle with usually 2 feeble spines. Soft dorsal and anal short, the latter with 2 spines. Vent close in front of anal.

A genus of Atlantic deep-sea fishes.

Key to the South African species.

1. Depth $4\frac{1}{5}$ in length . . . . . *macrops.*
2. Depth $3\frac{3}{4}$ in length . . . . . *telescopus.*

**Epigonus macrops* G. and v. B.

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 14, pl. i, fig. 3.

Depth $4\frac{4}{5}$, length of head about 3, in length of body. Eye $2\frac{1}{2}$ in length of head, not quite twice length of snout. Maxilla extending to below anterior third of eye. No teeth on vomer or palatines. Opercle with 1 spine. Preopercle rounded but not produced backwards. D VII+I 9, 1st spine short, 2nd about $\frac{2}{3}$ length of 3rd, 4th longest; spine of 2nd dorsal about equal to eye. A II 9. Caudal emarginate. Scales: l.l. 50; l.tr. $\frac{4}{10}$.

Length.—Up to 198 mm.

Colour.—Not stated.

Locality.—Off west coast (30° 12′ S., 14° 25′ E., and 31° 58′ S., 16° E.), 510–670 fathoms.

Type in coll. Govt. Marine Survey.

This species is very probably the immature form of *telescopus*.

Epigonus telescopus (Risso).

1810. Risso, Ichth., p. 301, pl. ix, fig. 31, and ed. 2, p. 387.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 171, pl. xxiv, and 1830, *ibid.*, vol. vi, p. 495.

1836–44. Valenciennes in Webb and Berthelot, Ichth. Iles Canar., p. 6, pl. i.

1881. Moreau, Hist. Nat. Poiss. France, vol. ii, p. 387.

1895. Goode and Bean, Ocean. Ichth., p. 232.

Depth $3\frac{3}{4}$, length of head $2\frac{4}{5}$, in length of body. Eye equal to interorbital width, 3 in length of head, $1\frac{1}{3}$ times the snout. Maxilla extending to below anterior third of eye. Teeth in narrow bands on jaws, becoming a single series posteriorly ; those on palatines in bands in several series, twice as wide as bands on jaws ; a circular patch on vomer ; none on tongue. Lower jaw not projecting. Both nostrils ovate, without raised rims. Whole head, including snout, scaly. Gill-rakers 15 on lower part of anterior arch, long and stout. Angle of preopercle rounded and produced backwards, with some very minute and feeble serrations. D VII+I 10, 1st spine not quite $\frac{1}{3}$ length of 2nd, 4th longest, equal to eye. A II 9. Caudal forked. Soft dorsal and anal scaly. Scales : l.l. 55 (the last 4 or 5 on tail) ; l.tr. $\frac{3}{11}$.

Length.—Up to 560 mm.

Colour.—Uniform blackish, including mouth and branchial chamber and peritoneum.

Locality.—Off Saldanha Bay, 500 fathoms.

Distribution.—Mediterranean, Canaries, Madeira. According to Valenciennes (1836–44, *loc. cit.*) occurs also at St. Helena.

The above description is taken from a very fine specimen, 500 mm. in length, brought in by a trawler from approximately the same locality as the preceding species, which it much resembles superficially. It is, however, distinguished by its robust build, deeper body, and dentition. It is possible that *macrops* is the immature form of *telescopus*.

The character of the dentition seems to be variable, as I am informed by Mr. J. R. Norman, of the British Museum, who has examined several specimens. Dr. Pellegrin, to whom I owe the reference to Moreau, has examined three adults in the Paris Museum, all of which possess the palatine teeth. The absence of palatine teeth has been regarded as diagnostic of the genus in spite of the descriptions given by Cuvier and Valenciennes (*loc. cit.*, vi), and Moreau.

In the former description the number of pyloric caeca is given as 22. The present specimen, though otherwise in excellent condition, has the internal organs in too poor a condition to determine the number of pyloric caeca.

PARAHYNNODUS n. g.

Body rather elongate, with moderate-sized ctenoid scales. Head scaleless. Eye very large. No teeth in the jaws, or on palate or tongue. Preopercle with submarginal ridge; outer margin thin, quadrate, entire. Opercle with a low horizontal ridge ending in a spine. Maxilla narrow, concealed beneath the narrow preorbital, except the posterior end. First dorsal with 7 spines; 2nd dorsal with 8 rays. Anal with 2 spines and 8 rays. Anal arising below posterior third of base of 2nd dorsal. Caudal (?) emarginate. Vent close in front of anal. Lateral line pores simple.

Close to *Hynnodus* Gilb. (1905, Bull. U.S. Fish. Comm., vol. xxiii, pt. 2, p. 617), and especially to *Scepterias* Jord. and Jord. (1922, Mem. Carn. Mus., vol. x, p. 44), but differing in the complete absence of teeth, fewer soft dorsal and anal rays, and slightly larger scales. Gilbert's description of the lateral line scales in *Hynnodus* does not apply to those of the Cape species.

Parahynnodus robustus n. sp.

Depth $4\frac{2}{3}$, length of head 3, in length of body. Eye $2\frac{1}{3}$, snout $4\frac{1}{2}$, interorbital width 4, in length of head. Maxilla extending to below anterior third of eye. Lower jaw projecting, ending in 2 small points; 2 pores below. Gill-rakers 22 on lower part of anterior arch; long, strong, and closely set. D VII+I 8, 1st spine very short, 3rd longest, slightly longer than eye. A II 8. Scales: l.l. 48; l.tr. $\frac{3}{11}$. Pyloric caeca 5. (Plate XXII, fig. 4.)

Length.—170 mm.

Colour (preserved).—Pale, mouth and branchial chamber also pale, peritoneum brown.

Locality.—Off Cape Point, 460 fathoms.

Type in South African Museum.

The single specimen is well preserved, though the tail is broken, and most of the scales except those along the lateral line are lost.

Gen. CHILODIPTERUS Lacép.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 539 (*Cheilodipterus*).
1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 144 (*Paramia*).
1912. Radcliffe, Proc. U.S. Nat. Mus., vol. xli, p. 441.
1913. Weber, Siboga Exp. Monogr., 57, p. 239.

Body oblong, with large, deciduous, ctenoid scales. Villiform teeth in jaws, and on vomer and palatines; canine teeth also in jaws. Preopercle with a submarginal ridge, outer edge serrate. Opercle without spine. Soft dorsal and anal short. Anal with 2 spines. Caudal emarginate. Vent about midway between anal and ventrals.

Tropical and subtropical small fishes from the shallow waters of the Indo-Pacific region, distinguished from *Apogon* by the canines in the jaws and the usually shallower body.

As in *Apogon*, oral gestation of the eggs by the male occurs in some species of this genus.

Chilodipterus quinquelineata C. and V.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 167.

1876. Bleeker, Atl. Ichthyol., vol. vii, p. 105, pl. cccxxvi, fig. 2.

1878–88. Day, Fish. India, p. 66.

1901. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiii, p. 907.

Depth $3\frac{1}{3}$–$3\frac{1}{2}$, length of head $2\frac{2}{5}$–$2\frac{2}{3}$, in length of body. Eye longer than snout, 3 in length of head. Maxilla extending to below posterior third of eye. D VI+I 9. A II 8–9. Vent distant from anal $\frac{1}{3}$ distance between anal and bases of ventrals. Scales: l.l. 25.

Length.—Up to 130 mm.

Colour.—Silvery, 5 black longitudinal stripes on each side, the middle 3 starting on the head, the uppermost on each side unites before and behind the dorsal fins to form a median stripe, base of caudal yellowish, tip of 1st dorsal blackish.

Locality.—Mozambique.

Distribution.—Red Sea, Indian seas, East Indies, Western Pacific.

Gen. Synagrops Gnthr.

1883. Döderlein, Denkschr. Ak. Wiss. Wien, vol. xlviii, p. 5 (*Melanostoma* nom. preocc.).

1887. Günther, Challeng. Rep., vol. xxii, p. 162.

1889. Alcock, J. As. Soc. Beng., vol. lviii, p. 296 (*Parascombrops*).

1895. Goode and Bean, Ocean. Ichth., p. 236 (*Hypoclydonia*) and p. 522.

1899. Alcock, Cat. Deep-sea Fish. Ind. Mus., p. 24.

1912. Radcliffe, Proc. U.S. Nat. Mus., vol. xli, p. 444.

1913. Weber, Siboga Exp. Monogr., 57, p. 195.

Body rather elongate, with rather large, deciduous, cycloid scales.

Villiform teeth in jaws, on vomer and palatines; strong canines in jaws. Preopercle without submarginal ridge, its angle produced, with fine serrations. Opercle with 2 spines. Soft dorsal and anal short. Anal with 2 spines. Dorsal, anal, and ventral spines often serrate.* Vent close in front of anal.

A deep-sea genus from the Indo-Pacific Ocean.

**Synagrops natalensis* Gilch.

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 69.

Depth 4, length of head 3, in total length. Eye $3\frac{2}{3}$, snout $4\frac{2}{3}$, in length of head. Lower jaw with 5 canines at side, 3 smaller ones in front, and 1 at symphysis. D IX+I 10. A II 8. Outer edge of spine of ventral fin not serrate. Scales: l.l. ca. 33.

Length.—Not stated.

Colour.—Not stated.

Locality.—Natal coast, 233 fathoms.

Type in coll. Govt. Marine Survey.

Gen. Scombrops T. and S.

1846. Temminck and Schlegel, Fauna Jap. Poiss., p. 118.

1895. Goode and Bean, Ocean. Ichth., p. 235.

1901. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiii, p. 910.

Body elongate, with small, thin, cycloid scales. Strong canines in jaws; a patch on vomer, and 2–3 series of sharp teeth on palatines. Preopercle without submarginal ridge, its edge not serrate. Opercle with 2 feeble spines. First dorsal with 8 feeble spines; 2nd dorsal and anal rather long. Anal with 3 spines. Vertical fins scaly. Vent not far in front of anal fin.

A deep-sea genus from Japan and the West Indies.

Scombrops dubius Gilchr.

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 66, pl. xi, fig. 1.

Depth $3\frac{2}{3}$–4, length of head $2\frac{3}{4}$–3, in length of body. Eye 3–$3\frac{1}{6}$, interorbital width $4\frac{1}{3}$–$4\frac{2}{3}$, snout 4 in length of head. Lower jaw slightly

* Jordan (1922, Mem. Carn. Mus., vol. x, p. 44, footnote) places *S. serratospinosa* Smth. and Rad. with serrated dorsal spines in a separate genus, *Maccullochina*.

projecting. Maxilla reaching to below centre of eye. Gill-rakers 13–15 on lower part of anterior arch, the anterior ones mere rudiments. D VIII+I 13, 3rd spine longest, nearly $\frac{1}{2}$ length of head. Space between the dorsals (measured from spine to spine) about 4 in length of head. A III 13. Pectoral $1\frac{2}{3}$–$1\frac{3}{4}$, ventral 2, in length of head. Scales : l.l. 53–55. Pyloric caeca 8.

Length.—Up to 360 mm.

Colour (preserved).—Grey or brownish, with a violet tinge.

Locality.—False Bay, Agulhas Bank, Algoa Bay, Natal, 26–207 fathoms.

Type in coll. Govt. Marine Survey.

The characters given by Gilchrist as differentiating this species from the Japanese species *boops* are not too satisfactory, as Gilchrist himself indicated. But when to these characters is added the fact that *dubius* has only 8 pyloric caeca as against 18 in *boops* (Günther, Challeng. Rep., vol. xxii, p. 14, 1887), the validity of the species would seem to be assured. The West Indian species *oculatus* Poey has 10 pyloric caeca.

The stomachs of the specimens in the South African Museum contain remnants of other fishes and of Squids (*Loligo*).

Gen. Neoscombrops Gilch.

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 67.

Body oblong, with thin, deciduous, cycloid scales. Villiform teeth in jaws, with a pair of canines at symphysis of upper jaw, a similar pair and a lateral series in lower jaw ; a patch on vomer, and a single series on each palatine. Preopercle without submarginal ridge, angle rounded, feebly denticulate. Opercle with 2 feeble spines. First dorsal with 9 spines, 2nd rather long. Anal short, with 3 spines. Vertical fins scaleless. Vent (?) normal.

A South African genus distinguished from *Scombrops* by the absence of lateral canines in the upper jaw and by the scaleless fins.

Neoscombrops annectens Gilch.

1922. Gilchrist, *loc. cit.*, p. 68, pl. xi, fig. 2.

Depth $3\frac{1}{4}$–$3\frac{1}{3}$, length of head $2\frac{2}{3}$–3, in length of body. Eye 3, snout $3\frac{1}{2}$, in length of head, the snout equal to the interorbital width. Maxilla extending to below centre of eye. D IX+I 9, 1st spine very

short, 2nd, 3rd, and 4th longest. A III 7. Caudal emarginate. Scales : l.l. 47. Four between lateral line and 1st dorsal.

Length.—180 mm. (S.A.M.).

Colour (as preserved).—Purplish brown.

Locality.—Natal coast, 62–260 fathoms.

Type in coll. Govt. Marine Survey.

In a specimen in the South African Museum the head is greater than depth of body ; Gilchrist's figure does not quite correspond with his description.

Gen. Acropoma Schl.

1846. Schlegel in Temminck and Schlegel, Fauna Jap. Poiss., p. 31.

1901. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiii, p. 911.

1909. Lloyd, Mem. Ind. Mus., vol. ii, p. 159 (*Synagrops*).

Body oblong, with moderate-sized, deciduous, cycloid or ctenoid scales. Villiform teeth in jaws and on vomer and palatines ; small canines at the symphysis of the jaws. Preopercle with a submarginal ridge, outer edge entire or serrate. Opercle produced backwards in a long membranous flap, with denticulate edge. Soft dorsal and anal short. Anal spines 3. Vent far forward, nearer base of ventrals than anal.

An Indo-Pacific deep-sea genus.

**Acropoma cynodon* Regan.

1921. Regan, Ann. Mag. Nat. Hist., (9), vol. vii, p. 415.

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 69.

Depth nearly 4, length of head $2\frac{3}{4}$, in length of body. Snout a little shorter than eye, which is $3\frac{1}{2}$ in length of head. Lower jaw projecting. Maxilla extending to below centre of eye. A pair of strong canines in upper jaw. Preopercular edge serrate. Gill-rakers 16 on lower part of anterior arch. D IX+I 10, almost contiguous, 3rd spine longest. A III 7. Caudal emarginate. Scales : l.l. ca. 47.

Length.—165 mm.

Colour.—Reddish (?).

Locality.—Natal coast, 130–230 fathoms.

Type in British Museum.

Fam. 22. Carangidae.

Horse-mackerels, Maasbankers, Albacores.

Body oblong or elongate, or short and deep, more or less compressed, with well-developed cycloid scales, or scales reduced and embedded in skin, or absent altogether. Caudal peduncle slender. Mouth moderate, more or less oblique, usually protractile. Maxilla not concealed. Subocular shelf present. Teeth generally small. Adipose eyelids often well developed. Nostrils paired. Gill-membranes usually not united, free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Two dorsal fins, contiguous, or more or less separate, spinous portion weak, spines short, usually depressible in a groove, soft portion long. In *Apolectus* a single long dorsal. Anal short or long, with 2 spines separate from the rest of the fin. Detached finlets at hinder end of dorsal and anal often present. Ventrals thoracic, of a spine and 5 rays, without axillary process. Caudal forked. Air-bladder present. Pyloric caeca usually numerous. Lateral line single, sometimes armed with bony scutes larger than the other scales of the body.

A large family represented in all temperate and tropical seas. Many of the species are pelagic and of wide distribution.

The eggs are in all cases, as far as yet known, pelagic, and the young often undergo considerable changes before reaching the adult shape.

Although most of the species are valued as food in all parts of the world, the only one of economic importance is the Maasbanker (*Trachurus trachurus*).

Key to the South African genera.

I. Two dorsal fins.
  A. Lateral line armed (at least in part) with scutes (*Caranginae*).
    1. Body scaly.
      a. Lateral line armed throughout . . . . *Trachurus.*
      b. Lateral line armed only on hinder part.
        i. Several detached finlets behind both dorsal and anal fins *Megalaspis.*
        ii. One finlet only . . . . . *Decapterus.*
        iii. No detached finlets.
          α. A deep furrow on isthmus . . . *Selar.*
          β. No furrow on isthmus . . . *Caranx.*
    2. Body naked (apparently; scales embedded), very deep and compressed.
      a. Soft dorsal and anal anteriorly elongate, rays filamentous *Alectis.*
      b. Soft dorsal and anal low . . . . . *Vomer.*

B. Lateral line without scutes.
1. Dorsal and anal equal in length, usually strongly falcate (*Trachynotinae*) . . . . . *Trachynotus.*
2. Dorsal and anal not, or only slightly, falcate.
a. Anal shorter than dorsal (*Seriolinae*).
i. No finlets.
α. Dorsal spines connected by membrane.
* L.l. with single slight curve.
† Snout conical . . . *Seriola.*
†† Snout short and blunt *Zonichthys.*
** L.l. with double curve . . *Lichia.*
β. Dorsal spines free . . . . *Naucrates.*
ii. One detached finlet behind both dorsal and anal *Elagatis.*
b. Anal equal to dorsal. Several finlets (*Scomberoidinae*) *Chorinemus.*
II. A single long dorsal fin, spines rudimentary, ventrals obsolete in adult *Apolectus.*

Gen. Trachurus Raf.

1810. Rafinesque, Ind. d'Itt. Sic., p. 20, and Caratt., p. 41.
1920. Nicholls, Bull. Amer. Mus., 42, p. 477.

Body elongate-oblong, rather compressed, with scales. Jaws, palate, and tongue with very fine teeth, usually in single series. First dorsal moderately high, preceded by a forwardly directed, procumbent spine. Anal about as long as soft dorsal. No finlets. Pectoral long, falcate. Lateral line armed with scutes throughout its length ; an accessory branch running along base of dorsal to its hinder end. Posterior adipose eyelid well developed.

Trachurus trachurus Linn.

Maasbanker ; Horse-mackerel.

1758. Linné, Syst. Nat., ed. 10, p. 298.
1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 11, pl. ccxlvi.
1916. Gilchrist, Mar. Biol. Rep., vol. iii, p. 9, fig. 5 (egg and larva).
1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 388 (references and synonymy).
1918. Thompson, Mar. Biol. Rep., vol. iv, p. 99 (references and synonymy).
1919. Fowler, Proc. U.S. Nat. Mus., vol. lvi, p. 290 (*semispinosus*).
1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 24 (references and synonymy).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 214 (*semi-spinosus*).

Depth 4–4$\frac{1}{3}$, length of head 3$\frac{1}{5}$–3$\frac{2}{3}$, in length of body. Eye subequal to snout, and to interorbital width, 3$\frac{1}{5}$–3$\frac{4}{5}$ in length of head. Maxilla extending to below anterior quarter of eye. Gill-rakers 48–50 on lower part of anterior arch. D I+VIII+I 30–34. A II+I 27–30. Scales: l.l. 70–77, of which 38–42 are spinose; height of scutes $\frac{3}{4}$ diameter of eye. (Plate XXIII, fig. 1.)

Length.—Up to 500 mm.

Colour.—Greenish or bluish above, silvery below, opercular spot and axil of pectoral blackish, iris very brilliant silvery, with a blue tinge.

Locality.—Off St. Helena Bay, Table Bay, False Bay, and Agulhas Bank to Natal, Zululand, Delagoa Bay, down to 100 fathoms.

Distribution.—N. and S. Atlantic. The Australian and Japanese forms are now considered as separate species.

Nicholls (*loc. cit.*), without, however, material for comparison, thinks that the Cape form should be distinct on account of geographical reasons. This view is not acceptable.

In the North Atlantic the Horse-mackerel migrates inshore for spawning during the summer months (June–August), and it appears that in South Africa the inshore migration occurs at about the corresponding season, or somewhat earlier (October–January).

The young fry have been observed to prefer the neighbourhood of jelly-fishes, under the umbrella of which they take shelter (Meek, Migrations of Fish, 1916, p. 316).

Gen. Megalaspis Blkr.

1851. Bleeker, Verh. Bat. Gen., vol. xxiv.*

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 147.

Body elongate-oblong, somewhat compressed, with scales. Jaws, palate, and tongue toothed. 1st dorsal moderately high. Anal about as long as soft dorsal. Dorsal and anal each with several detached finlets. Pectoral long, falcate. Shoulder-girdle without a furrow at its junction with isthmus. Lateral line with very high scutes, which are absent, however, anteriorly. Adipose eyelids well developed.

This genus contains only the following species.

* The name *Megalaspis* was used in the same year by Angelin for a Trilobite (Palaeont. Suec., I. i, 1851). I am unable to discover which author has priority.

Megalaspis cordyla (Linn.).

1758. Linné, Syst. Nat., ed. 10, p. 483.

1797. Bloch, Ichth., vol. x, p. 40, pl. cccxlvi (*rottleri*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 387 (*rottleri*) (references).

1924. Wakiya, *loc. cit.*, p. 147, pl. xv, fig. 1.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 214.

Depth of body equal to length of head, slightly less than 4 in length of body. Eye equal to or slightly greater than snout, about equal to interorbital width, $3\frac{3}{4}$–$3\frac{4}{5}$ in length of head. Gill-rakers about 20 on lower part of anterior arch. D VIII+I 10–11+8–9. A II+I 8–10+6–8. Scales: l.l. 50-54 spinose scutes on straight part, their height $1\frac{1}{2}$–2 times diameter of eye.

Length.—Up to 300 mm.

Colour.—Silvery, darker above, a black opercular spot, hind margin of caudal and tips of spinous and soft dorsals blackish, rest of fins yellowish, upper half of pectoral dusky.

Locality.—Natal coast.

Distribution.—Indo-Pacific to Japan and N.E. Australia.

Gen. Decapterus Blkr.

1851. Bleeker, Natuurk. Tyds. Ned. Ind., vol. i, p. 352.

1915. Ogilby, Mem. Queensl. Mus., vol. iii, p. 58.

1924. Wakiya, Ann. Carnegie Mus., vol. xv, p. 148.

Body elongate, more or less compressed, with scales. Teeth feeble. First dorsal moderately high. Anal about as long as soft dorsal. Dorsal and anal each with a single detached finlet. Pectoral long, falcate. Shoulder-girdle with a shallow groove at its junction with isthmus. Lateral line with scutes only on posterior straight part. Adipose eyelids well developed.

Key to the South African species.

1. Teeth on tongue obsolete. Anal with 24–26 soft rays . . . *russelli.*
2. Teeth present in a band on tongue. Anal with 28–30 rays.
   - *a.* Palatines not toothed.
     - i. Upper jaw toothed anteriorly . . . . . *muroadsi.*
     - ii. Upper jaw toothless . . . . . *macrosoma.*
   - *b.* Palatines toothed . . . . . *lajang.*

**Decapterus russelli* (Rüpp.).

1828. Rüppell, Atl. Fische, p. 99.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 44 (*kurra*).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 427 (*kurra*).

1915. Ogilby, Mem. Queensl. Mus., vol. iii, p. 59, pl. xix (references and synonymy).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321 (*kurra*).

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 149, pl. xv, fig. 2.

Depth 5, length of head $3\frac{1}{2}$, in length of body. Eye 5 in length of head, $1\frac{2}{3}$ in snout. Maxilla extending scarcely to below anterior margin of eye. Teeth in a single series on jaws; two small patches and a median strip on vomer; palatines, but not tongue, toothed (sometimes a very small patch on latter near hinder end). Opercular membrane sharply serrate, but indistinctly so in young. Gill-rakers 31–32 on lower part of anterior arch. D VIII+I 30–32+1. A II+I 24–26+1. Pectoral equal to head without snout. Scales: l.l. 45 spinose scutes on hinder part of line, their height just over half diameter of eye.

Length.—Up to 400 mm.

Colour.—Silvery, darker above, opercular spot black; snout, back, and all fins tinged with red; caudal with yellow margin.

Locality.—Natal coast.

Distribution.—Indo-Pacific to Japan and N.E. Australia.

**Decapterus muroadsi* (Schl.).

1844. Temminck and Schlegel, Fauna Jap. Poiss., p. 108, pl. lviii, fig. 1.

1884. Steindachner and Döderlein, Denkschr. Ak. Wiss. Wien, vol. xlviii, p. 37, pl. iv, fig. 1 (*sanctae-helenae* non C. and V.).

1924. Wakiya, *loc. cit.*, p. 152, pl. xvi, fig. 1.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 213 (*sanctae-helenae*).

Depth about $4\frac{1}{2}$, length of head $3\frac{1}{2}$–4, in length of body. Eye $5\frac{1}{5}$ in length of head (Wakiya; Fowler gives $3\frac{1}{2}$), less than snout. Maxilla scarcely reaching to anterior margin of eye. Teeth in a single series on the jaws, those on upper jaw only at anterior end; a transverse band on vomer; palatines and tongue toothed. Opercular membrane not serrate. Gill-rakers 28 on lower part of anterior arch. D VIII+I

31–33+1. A II+I 26–28+1. Pectoral a little longer than head without snout. Scales : l.l. 33 scutes on hinder part of line, their height equal to $\frac{1}{2}$ eye-diameter.

Length.—Up to 335 mm.

Colour.—Silvery, darker above, opercular spot black, a reddish or yellowish streak from snout to caudal, fins brownish.

Locality.—Delagoa Bay.

Distribution.—Japan.

The true Atlantic *sanctae-helenae* C. and V. appears to be distinguished by a series of black spots along the side.

**Decapterus macrosoma* Blkr.

1851. Bleeker, Nat. Tyds. Ned. Ind., vol. i, p. 358.

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 258.

1924. Wakiya, *loc. cit.*, p. 153, pl. xvi, fig. 2.

Depth $5\frac{1}{2}$, length of head $3\frac{4}{5}$, in length of body. Eye 5 in length of head, $1\frac{2}{3}$ in snout. Maxilla extending to below a point midway between posterior nostril and anterior margin of eye. Teeth very feeble, none in upper jaw or on palatines, a single series in lower jaw, a transverse band on front part of vomer, a band on tongue. Opercular membrane bluntly serrated, feebly so in young. D VIII+I 32–35+1. A II+I 28–30+1. Pectoral greater than head without snout. Scales : l.l. 27 spinose scutes on hinder part of line, their height $\frac{2}{3}$ diameter of eye.

Length.—Up to 350 mm.

Colour.—Silvery, darker above, opercular spot black.

Locality.—Natal coast.

Distribution.—East Indies, tropical Pacific, Japan.

Decapterus lajang Blkr.

1855. Bleeker, Nat. Tyds. Ned. Ind., vol. v, p. 302.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 425.

1924. Wakiya, *loc. cit.*, p. 155, pl. xvii, fig. 1.

Depth $5\frac{1}{4}$–$5\frac{1}{3}$, length of head 4, in length of body. Eye $4\frac{1}{2}$–$4\frac{3}{4}$ in length of head, $1\frac{1}{2}$ in snout. Maxilla extending almost to below anterior border of eye, its hinder end concave and expanded downwards. Teeth obsolete in upper jaw, in a single series in lower jaw and on palatines, a transverse and a median longitudinal series on vomer, a band on tongue. Opercular membrane not serrated. Gill-

rakers about 32 on lower part of anterior arch. D VIII+I 34–35+1. A II+I 28–30+1. Pectoral equal to head without snout. Scales: l.l. 28 spinose scutes on hind part of line, their height just over half diameter of eye.

Length.—Up to 260 mm.

Colour.—Silvery, darker above, opercular spot black.

Locality.—Simon's Bay in False Bay.

Distribution.—East Indies, tropical Pacific, Japan.

A single specimen in the South African Museum, measuring 175 mm. in length, agrees with Wakiya's description. It was caught in the trek-nets at the end of March 1911.

This species is very closely allied to the preceding and the other species of the genus, but is distinguished by the character of the dentition.

Gen. Selar Bleeker.

1851. Bleeker, Nat. Tyds. Ned. Ind., vol. i, p. 359.

1862. Gill, Proc. Ac. Nat. Sci. Philad., p. 431 (*Trachurops*).

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 159.

Body elongate, more or less compressed, with scales. Jaws, palate, and tongue toothed. Shoulder-girdle with a deep longitudinal furrow at its junction with isthmus. First dorsal moderately high. Anal about as long as soft dorsal. No detached finlets. Pectoral long, falcate. Lateral line not strongly curved, with scutes on its posterior portion. Breast scaly. Adipose eyelids well developed.

Key to the South African species.

1. Scutes 34–36 . . . . . *crumenophthalmus.*
2. Scutes 39–47.
   - *a.* Depth 2½ in length . . . . . *kalla.*
   - *b.* Depth 3¼ in length . . . . . *affinis.*
   - *c.* Depth 3½ in length . . . . . *tabulae.*

**Selar crumenophthalmus* (Bl.).

1793. Bloch, Ausl. Fische, vol. vii, p. 77, pl. cccxliii.

1824. Quoy and Gaimard, Voy. Uranie Zool., p. 359 (*mauritianus*).

1828. Rüppell, Atl. Fische, p. 97, pl. xxv, fig. 4 (*macrophthalmus*).

1878–88. Day, Fish. India, p. 217, pl. xlix, fig. 1.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxviii, p. 187, fig. 71 (synonymy).

1913. Weber, Siboga Exp. Monogr., 57, p. 398.

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 458.

1924. Wakiya, Ann. Carn. Mus., vol. xv, pp. 159, 160, pl. xviii, figs. 2, 3 (*mauritianus* and *macrophthalmus*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 214.

1925. Meek and Hildebrand, Field Mus. Nat. Hist., zool. ser., vol. xv, p. 335.

Depth $3\frac{1}{5}$–$3\frac{1}{2}$, length of head 3–$3\frac{1}{3}$, in length of body. Eye $3\frac{1}{5}$–$3\frac{1}{2}$ in length of head, about equal to snout and to interorbital width. Maxilla extending to below centre of eye. Teeth in a very narrow band in upper, in a single series in lower, jaw; very weak on palate and tongue. Gill-rakers 23–27 on lower part of anterior arch. D VIII+I 23–26. A II+I 20–23. Pectoral $1\frac{1}{5}$–$1\frac{1}{4}$ in length of head. Scales: l.l. scutes 34–36 (Day, 27–32), commencing under 9th or 10th dorsal ray. Lateral line scarcely curved.

Length.—Up to 300 mm.

Colour.—Silvery, darker above, opercular spot very faint.

Locality.—Natal coast.

Distribution.—Circumtropical.

There is some doubt as to whether the Atlantic form (*crumenophthalmus*) should include the Indo-Pacific, or whether the latter should be separated under the name *mauritianus*; but see Fowler (1919, Proc. U.S. Nat. Mus., vol. lvi, p. 209).

Selar kalla (C. and V.).

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 49.

1878–88. Day, Fish. India, p. 219, pl. xlix, fig. 5.

1915. Ogilby, Mem. Queensl. Mus., vol. iii, p. 62, pl. xx (references and synonymy).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 383 (references).

1917. Jordan and Starks, Ann. Carn. Mus., vol. xi, p. 443 (*calla*).

1925. Fowler, J. Bomb. Nat. Hist. Soc., vol. xxx, pt. 2, p. 317.

1925. *Id.*, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 215.

Depth $2\frac{1}{2}$–$2\frac{2}{3}$, length of head $3\frac{1}{2}$, in length of body. Eye 3 in length of head, slightly greater than snout and than interorbital width. Teeth in a single row in jaws. Maxilla reaching to below anterior third of eye. Ventral profile more strongly curved than dorsal. Gill-rakers 27–28 on lower part of anterior arch. D VIII+I 23–24. A II+I 19–20. Pectoral longer than head, nearly equal to depth of body.

Scales : l.l. scutes 40–45, commencing below 4th or 5th dorsal ray. Lateral line moderately curved.

Length.—Up to 200 mm.

Colour.—Silvery, darker above, a black opercular spot, caudal yellow, other fins pale, dorsal with dusky margin.

Locality.—Natal coast, Delagoa Bay.

Distribution.—Indian seas to China and N.E. Australia.

**Selar affinis* (Rüpp.).

1835. Rüppell, Neue Wirbelt. Fische, p. 49, pl. xiv, fig. 1.

1878–88. Day, Fish. India, p. 219, pl. xlix, fig. 4 (references and synonymy).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 195, fig. 76.

1917. Jordan and Starks, Ann. Carn. Mus., vol. xi, p. 443.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 25.

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 200, pl. xxx, fig. 1.

Depth $3\frac{1}{4}$–$3\frac{1}{3}$, length of head $3\frac{1}{2}$–$3\frac{2}{3}$, in length of body. Eye 4–5 in length of head, slightly less than snout and than interorbital width. Teeth in a single row in jaws, except at symphysis. Maxilla reaching to below anterior margin of eye. Dorsal and ventral profiles equally curved. D VIII+I 23–24. A II+I 19–21. Pectoral longer than head and equal to depth of body. Scales : l.l. scutes 42–47, commencing below 6th or 7th dorsal ray. Lateral line moderately curved.

Length.—Up to 230 mm.

Colour.—Silvery, darker above, with a series of short vertical bars, a black opercular spot, fins yellow, soft dorsal posteriorly, with dusky margin.

Locality.—Natal coast.

Distribution.—Indo-Pacific to N.W. Australia.

Selar tabulae n. sp.

Depth about equal to length of head, $3\frac{1}{2}$ in length of body. Eye $1\frac{1}{3}$ in snout and in interorbital width, 4 in length of head. Lower jaw projecting. Teeth very small, uniserial and nearly obsolete in jaws, in narrow bands on vomer, palatines, and tongue ; the vomer has a transverse anterior and a median band. Maxilla reaching to below anterior margin of eye, or slightly further. Posterior adipose eye-

lid well developed. Gill-rakers 55 on lower part of anterior arch. D I+VIII+I 38. A II+I 30. Pectoral falcate, equal to length of head. Scales : l.l. scutes 39, commencing below 6th or 7th dorsal ray, their margins denticulate. Lateral line moderately curved. Breast and whole of head, including interorbital, but not the snout, scaly.

Length.—410 mm.

Colour.—Silvery, darker above, a black opercular spot, spinous dorsal blackish, soft dorsal and anal dusky.

Locality.—Table Bay,

Type in South African Museum.

This species appears at first sight near to *D. sanctae-helenae* C. and V., but apart from the absence of the black lateral spots it has no detached finlet behind dorsal and anal fins, and has longer falcate pectorals.

Gen. Caranx Lacép.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 57.
1915. Ogilby, Mem. Queensl. Mus., vol. iii, p. 66.
1924. McCulloch, *ibid.*, vol. viii, p. 67 (key to Australian species).
1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 162.

Body oblong or ovate, compressed, with scales. Dentition various. Shoulder-girdle not furrowed. First dorsal moderately high, preceded by a forwardly directed procumbent spine. Anal about as long as soft dorsal. Soft dorsal and anal often falcate anteriorly. No detached finlets. Pectoral long, falcate. Lateral line moderately curved, with scutes on its posterior straight portion. Adipose eyelids more or less developed. Breast with or without scales.

The subdivision of this genus is fraught with difficulty, as all the characters which have been used by various authors appear liable to considerable variation and intergradations. Conservative authors, in fact, have not accepted the separation of such genera as *Decapterus*, *Selar*, etc. The course here adopted in separating certain distinctive forms is admittedly done for the sake of convenience.

Key to the South African species.

I. Teeth present.
  A. Teeth in villiform bands in both jaws.
    1. Breast scaly . . . . . *equula.*
    2. Breast naked.
      a. Gill-rakers 16–17. Scutes 25–28 . . *chrysophrys.*
      b. Gill-rakers 23–24. Scutes 25–28 . . *malabaricus.*
      c. Gill-rakers 21. Scutes 17–25 . . . *armatus.*

B. Teeth in upper jaw in a narrow band with an outer enlarged series, in lower jaw uniserial with some larger ones intermixed.
1. Breast scaly.
a. Gill-rakers 15. Scutes 30–35 . . . . *forsteri.*
b. Gill-rakers 18. Scutes 34–38 . . . *melampygus.*
2. Breast scaleless except an oval patch in front of ventrals.
a. Scutes 33–37 . . . . . *carangus.*
b. Scutes 28–30 . . . . . *ignobilis.*
C. Teeth uniserial in both jaws.
1. Snout not twice diameter of eye . . . . *djeddaba.*
2. Snout twice diameter of eye . . . . . *dentex.*
II. Teeth absent (at least in adult) . . . . . *speciosus.*

Caranx equula T. and S.

1844. Temminck and Schlegel, Fauna Jap. Poiss., p. 111, pl. lx, fig. 1.

1857. Bleeker, Verh. Batav. Gen., vol. xxvi, p. 102.

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 166, pl. xix, fig. 3.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 214 (*dasson*).

Body compressed. Depth $2\frac{1}{10}$, length of head 3, in length of body. Eye 4 in length of head, $1\frac{1}{2}$ in snout and in interorbital width. Maxilla reaching to, or slightly beyond, front margin of eye. Teeth in villiform bands in jaws and on vomer, palatines, and tongue. Adipose eyelids feebly developed. Gill-rakers 19–20 on lower part of anterior arch. D I+VIII+I 23–25. A II+I 21–23. Anterior rays of soft dorsal and anal not falcate. Pectoral as long as, or slightly longer than head. Scales: l.l. scutes 26(–28), rather feebly armed, commencing below about the 15th dorsal ray. Breast scaly.

Length.—Up to 200 mm.

Colour.—Yellowish-silvery, darker above, with 5–6 broad, dark, vertical bars, more distinct in young, with or without a dark opercular spot, spinous dorsal dusky, soft dorsal and anal with a submarginal dark stripe, leaving the margin light.

Locality.—Agulhas Bank, 30 fathoms; Natal coast, 40 fathoms.

Distribution.—East Indies and Japan.

Fowler's description evidently applies to this species.

Caranx chrysophrys C. and V.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 77, pl. ccxlvii.

1851. Bleeker, Nat. Tyds. Ned. Ind., p. 366 (*chrysophryoides*).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 328, pl. xxxi, fig. 4.

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 242 (*chrysophryoides*).

1909. *Id.*, *ibid.*, p. 244 (*Carangichthys typus* non Blkr.).

1915. Ogilby, Mem. Queensl. Mus., vol. iii, p. 77, pl. xxiv.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 384 (*chrysophryoides*).

1917. *Id.*, *ibid.*, p. 388 (*Carangichthys typus* non Blkr.).

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 180, pl. xxiv, fig. 1.

Body strongly compressed. Profile of head and breast trenchant (in adult). Depth $1\frac{1}{2}$ (young)–$2\frac{1}{4}$ (adult), length of head about 3, in length of body. Eye 4 in length of head, $1\frac{1}{2}$ in snout, about equal to interorbital width. Teeth in villiform bands in both jaws, and on vomer, palatines, and tongue. Maxilla reaching to below anterior quarter of eye. Adipose eyelids feebly developed. Gill-rakers 16–17 on lower part of anterior arch. D I+VIII+I 18–20. A II+I 16–17. Anterior portion of soft dorsal and anal falcate, the longest rays in each about equal, $\frac{1}{2}$–$\frac{3}{4}$ depth of body (longer in young than adult). Pectoral longer than head. Scales: l.l. scutes 25–28, rather feebly armed, commencing below about middle of soft dorsal. Breast naked.

Length.—Up to 315 mm.

Colour.—Silvery, darker above, soft dorsal and anal dusky, with or without a small dark opercular spot, but the opercle below the position of the spot has an irregular dusky patch, ventrals blackish in young.

Locality.—Natal coast, Mozambique.

Distribution.—Indo-Pacific to Formosa and N.E. Australia.

The genus *Carangichthys* was instituted by Bleeker for a juvenile form with denticulate preopercle. This character, however, is common to the young of many species of *Caranx*. Gilchrist and Thompson's specimen belongs to this species.

**Caranx malabaricus* (Bl. Schn.).

1801. Bloch Schneider, Syst. Ichth., p. 31.

1878–88. Day, Fish. Ind., p. 221, pl. v, fig. 2.

1924. Wakiya, *loc. cit.*, p. 178, pl. xxiii, fig. 3.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 216.

Body strongly compressed. Profile of nape elevated. Depth 2, length of head 3–$3\frac{1}{3}$, in length of body. Eye $3\frac{1}{2}$–4 in length of head, $1\frac{1}{4}$ in snout. Teeth in villiform bands on both jaws, and on vomer, palatines, and tongue. Maxilla extending to below anterior border of

eye. Adipose eyelids feebly developed. Gill-rakers 23–24 on lower part of anterior arch. D I+VIII+I 22. A II+I 18–19. Anterior portion of soft dorsal and anal falcate, dorsal a little higher than anal, about $\frac{1}{2}$ depth of body. Pectoral longer than head. Scales : l.l. scutes 25–28, feebly armed, commencing below about middle of soft dorsal. Breast naked.

Length.—Up to 300 mm.

Colour.—Silvery, darker above, soft dorsal and caudal with blackish margins, a black opercular spot, axil black.

Locality.—Natal coast, Delagoa Bay.

Distribution.—Indo-Pacific to Formosa.

Distinguished from *chrysophrys* by the more elevated nape, shorter snout relatively to eye, and number of dorsal and anal rays.

Caranx armatus (Forsk.).

1775. Forskal, Desc. Anim., vol. xii, p. 53.

1828. Rüppell, Atl. Fisch., p. 102, pl. xxv, fig. 8 (*ciliaria*).

1878–88. Day, Fish. India, p. 223, pl. li, fig. 2 (references and synonymy).

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 169, pl. xx, fig. 1 and p. 170, pl. xx, fig. 2 (*schlegeli* nom. nov. for *ciliaris* C. and V.) ; p. 171, pl. xx, fig. 3 (*plumbeus*) ; p. 172, pl. xxi (*ciliaris* Rüpp.).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 217.

Body strongly compressed, Profile of head trenchant, the nape prominently elevated. Depth $1\frac{9}{10}$–$2\frac{1}{10}$, length of head $3\frac{1}{4}$–$3\frac{1}{2}$, in length of body. Eye $3\frac{1}{2}$ in length of head, about equal to snout and to interorbital width. Maxilla reaching to below middle of eye. Teeth in narrow villiform bands in jaws and on vomer, palatines, and tongue. Adipose eyelids feebly developed. Gill-rakers 21 on lower part of anterior arch. D I+VIII+I 20–21. A II+I 16–17. Soft dorsal and anal anteriorly strongly falcate, the 1st ray of each produced into a long filament, middle rays of dorsal filamentous and produced in ♂. Scaly sheath at base of dorsals and anal very prominent. Pectoral considerably longer than head. Scales : l.l. scutes 17–25, feebly armed (and therefore permitting considerable latitude in counting at the anterior end), commencing below about the posterior third of soft dorsal. Breast naked. Two oblique ridges or keels on each side of base of tail.

Length.—Up to 500 mm.

Colour.—Silvery, darker above, spinous dorsal and ventrals usually

blackish, 1st rays of soft dorsal and anal black, pectoral yellowish, a black opercular spot, axil black ; young vertically banded.

Locality.—Delagoa Bay.

Distribution.—East coast of Africa, Indian seas to Formosa, and N.E. Australia.

Caranx forsteri C. and V.

King-fish (Natal).

? 1824. Quoy and Gaimard, Voy. Uranie Poiss., p. 358, pl. lxv, fig. 4 (*sexfasciatus*).

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 105.

1876–81. Günther, Fische d. Südsee, vol. ii, p. 131, pl. lxxxiv (*hippos* non Linn.).

1878–88. Day, Fish. India, p. 216 (*hippos* non Linn.).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 329, pl. xxxi, fig. 3.

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 240 (*hippos* non Linn.).

1913. Weber, Siboga Exp. Monogr., 57, p. 395.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 385 (*latus* non Agass.) (synonymy not applicable to this species).

1917. Jordan and Starks, Ann. Carn. Mus., vol. xi, p. 442.

1918. Regan, Ann. Durban Mus., vol. ii, pt. 2, p. 76 (*hippos*).

1921. Gilchrist, Tr. Roy. Soc. S. Afr., vol. x, p. 24 (*djeddaba* non Forsk.).

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 184, pl. xxv, figs. 3 and 4 (*sexfasciatus* Q. and G.).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 216 (*sexfasciatus*).

Depth $2\frac{1}{2}$–$2\frac{3}{4}$, length of head 3–$3\frac{1}{3}$, in length of body. Eye 4–$4\frac{1}{2}$ in length of head, subequal to snout, slightly less than interorbital width. Teeth in a narrow band in upper jaw, with an outer enlarged series, in a single row in lower jaw ; teeth on vomer, palatines, and tongue. Maxilla reaching to below posterior third of eye. Posterior adipose eyelid well developed. Gill-rakers 15–16 on lower part of anterior arch. D I+VIII+I 20–21. A II+I 16–17. Anterior portion of soft dorsal and anal shortly falciform, longest dorsal ray at least twice in depth of body. Pectoral longer than head. Scales : l.l. scutes 30–33, commencing below 3rd dorsal ray. Breast completely scaly.

Length.—Up to 1000 mm.

Colour.—Silvery, darker above ; dorsals, anal, and caudal dusky ;

pectoral bright yellow; no dark opercular spot or a very small one; young usually with broad, dark, vertical cross-bars.

Locality.—Natal and Zululand coast, Delagoa Bay.

Distribution.—Indo-Pacific.

Wakiya (*loc. cit.*) identifies this species with *sexfasciatus* Q. and G., and Jordan, who revised the paper, seems to imply his agreement in a footnote on p. 191, though in earlier papers (1909, Mem. Carn. Mus., vol. iv, p. 179, and 1917, *loc. cit. supra*) he and his collaborators have retained the name *forsteri*. It is quite certain, however, that this form is distinct from the true *hippos* Linn. of the Atlantic.

The examples from Dar-es-Salaam, referred to by Gilchrist (*loc. cit. supra*) as living in captivity in the St. James Aquarium, are now in the South African Museum, and belong to this species.

Caranx melampygus C. and V.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 116.

1876–81. Günther, Fische d. Südsee, vol. ii, p. 133, pl. lxxxvi.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 192, fig. 73.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 386 (references).

1924. McCulloch, Mem. Queensl. Mus., vol. viii, p. 70, pl. xi, fig. 2.

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 192.

1925. Meek and Hildebrand, Field Mus. Nat. Hist., zool ser., vol. xv, p. 353.

Depth $2\frac{1}{2}$–$2\frac{2}{3}$, length of head $3\frac{1}{5}$–$3\frac{1}{3}$, in length of body. Eye $3\frac{3}{4}$–$4\frac{3}{4}$ in length of head, less than snout, about equal to interorbital width. Teeth in a narrow band in upper jaw, with an outer enlarged series, in a single row in lower jaw; teeth on vomer, palatines, and tongue. Maxilla reaching to below anterior third of eye. Posterior adipose eyelid well developed. Gill-rakers 18 on lower part of anterior arch. D I+VIII+I 21–23. A II+I 18–19. Anterior portion of soft dorsal and anal falciform, longest dorsal ray $1\frac{1}{2}$ in depth of body. Pectoral slightly longer than head. Scales: l.l. scutes 34–38, commencing below 3rd dorsal ray. Breast completely scaly, except near isthmus.

Length.—Up to 600 mm.

Colour.—Silvery, darker above, with or without small dark dots; dorsals, anal, and caudal dusky, no dark opercular spot.

Locality.—Zululand coast.

Distribution.—Indo-Pacific.

Caranx carangus (Bl.).

King-fish (Natal).

1788. Bloch, Ichthyol., p. 340.

1878–88. Day, Fish. India, p. 215, pl. l, fig. 4.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 325.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 384 (references).

Depth $2\frac{1}{3}$–$2\frac{3}{4}$, length of head $3\frac{1}{5}$–$3\frac{1}{2}$, in length of body. Eye $3\frac{1}{2}$–4 in length of head, equal to snout and to interorbital width. Teeth in a narrow band in upper jaw, with an outer enlarged series, in a single series in lower jaw; teeth on vomer, palatines, and tongue. Maxilla reaching to below middle of eye. Posterior adipose eyelid narrow. Gill-rakers 16–17 on lower part of anterior arch. D I+VIII+I 20–22. A II+I 16–18. Anterior portion of soft dorsal and anal falcate, longest dorsal ray $1\frac{2}{3}$–$1\frac{3}{4}$ in depth of body. Pectoral considerably longer than head. Scales: l.l. scutes 33–37, commencing below 5th or 6th dorsal ray. Breast naked, with an oval patch of scales in front of ventrals.

Length.—Up to 400 mm.

Colour.—Silvery, darker above, 1st dorsal and margin of soft dorsal and of caudal dusky, opercular spot, if present, small.

Locality.—Natal coast, Delagoa Bay.

Distribution.—Indian seas, East Indies, tropical Atlantic.

Distinguished from *melampygus* by the incompletely scaly breast and lower soft dorsal.

I am inclined to think that Fowler's specimen from Delagoa Bay, which he records (1925, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 216) as *C. sansun* (Forsk.) is conspecific with the specimens I have seen from Natal and Delagoa Bay, and here regarded as *carangus*.

Jordan and Evermann (1905, Bull. U.S. Fish. Comm., vol. xxiii, p. 190) regard *sansun* as a synonym of *ignobilis*.

**Caranx ignobilis* (Forsk.).

1775. Forskal, Descr. Anim., p. 55.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 188, fig. 72.

1924. Wakiya, *loc. cit.*, p. 193, pl. xxvii, fig. 3.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 215.

Depth a little over 2, length of head $3\frac{1}{5}$–$3\frac{1}{2}$, in length of body. Eye

$3\frac{1}{2}$–$3\frac{7}{8}$, in length of head, 1–$1\frac{1}{4}$ in snout. Teeth in a single series in both jaws, rather strong, canine-like ; teeth on vomer, palatines, and tongue. Maxilla reaching to below centre of eye. Adipose eyelid narrow. Gill-rakers 15 on lower part of anterior arch. D I+VIII+I 19–21. A II+I 16–17 (Jord. and Everm., 19). Anterior portion of soft dorsal and anal falciform, about $\frac{1}{2}$ depth of body. Pectoral longer than head. Scales : l.l. scutes (27)28–30, commencing below about 6th dorsal ray. Breast naked below, with a small patch of scales in front of ventrals.

Length.—Up to 550 mm.

Colour.—Silvery, darker above, no black spot on opercle, or only a faint dusky spot, dorsal fins and caudal greyish.

Locality.—Delagoa Bay.

Distribution.—Indo-Pacific to Japan.

Caranx djeddaba (Forsk.).

1775. Forskal, Desc. Anim., vol. xii, p. 56.

1878–88. Day, Fish. India, p. 218, pl. xlix, fig. 3.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 385 (references).

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 199, pl. xxix, fig. 1.

1925. Fowler, J. Bomb. Nat. Hist. Soc., vol. xxx, p. 316.

Depth $2\frac{3}{5}$–3, length of head $3\frac{1}{2}$–4, in length of body. Eye about equal to snout and to interorbital width, about 4 in length of head. Teeth minute, uniserial in both jaws, in narrow bands on vomer, palatines, and tongue. Maxilla reaching to below anterior third of eye. Posterior adipose eyelid well developed. Gill-rakers 26–28 on lower part of anterior arch. D I+VIII+I 22–25. A II+I 19–22. Soft dorsal and anal not falcate. Pectoral slightly longer than head. Scales : l.l. scutes 45–58, commencing below 1st dorsal ray. Breast scaly.

Length.—Up to 350 mm.

Colour.—Silvery, darker above, fins yellowish, spinous and soft dorsals and caudal dusky, a black opercular spot.

Locality.—Natal, Delagoa Bay.

Distribution.—East coast of Africa, Indian seas to Formosa.

Caranx dentex (Bl. Schn.).

1801. Bloch Schneider, Syst. Ichth., p. 30.

1827. Geoffr. St. Hilaire, Descr. Egypte. Poiss., pl. xxiii, fig. 3 (*luna*).

1836–44. Valenciennes in Webb and Berthelot, Iles Canar. Poiss., p. 57, pl. xii (*analis*).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 441.

1911. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xi, p. 39 (*natalensis*).

1911. Zugmayer, Res. Sci. Monaco, fasc. xxxv, p. 106.

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 65.

1915. Clark, Sci. Res. " Scotia," vol. iv, p. 396.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 387 (*natalensis*).

Depth $2\frac{4}{5}$–$3\frac{1}{4}$, length of head about $2\frac{3}{4}$–3, in length of body. Eye 5–6 in length of head, 2–$2\frac{1}{2}$ in snout, not quite 2 in interorbital width. Lower jaw shorter than upper. Teeth in a single series in jaws and on tongue ; none on vomer or palatines (a single row on palatines in *natalensis*). Maxilla scarcely reaching vertical from anterior border of eye. Adipose eyelids feebly developed. Gill-rakers 23–27 on lower part of anterior arch. D I+VIII+I 24–27. A II+I 20–22. Soft dorsal and anal not falcate. Pectoral about as long as head. Scales : l.l. scutes 24–28, commencing below about the middle of soft dorsal. Breast and whole of opercle, except margin of preopercle, scaly.

Length.—Up to 825 mm.

Colour.—Silvery, darker above, a black opercular spot, fins yellowish or greyish.

Locality.—Table Bay, Natal coast.

Distribution.—Tropical and subtropical Atlantic to Mediterranean.

Type of *natalensis* in South African Museum.

Jordan and Evermann (1896, Fish. N. and Mid. Amer., vol. i, p. 927) record this species under the name *guara* Bonn 1788, and suggest with some doubt that it may be the same as the earlier *adscensionis* Osbeck 1757.

The occurrence of true *dentex* in South Africa rests on the " Scotia " record (Table Bay), and the British Museum specimen from Durban. The original description of *natalensis* is faulty in several respects. Re-examination of the type specimens (330 and 230 mm.) leaves little doubt that they should be assigned to *dentex*. Mr. J. R. Norman of the British Museum, who has seen a cotype, is disposed to agree with this conclusion.

The group, however, which is represented in the Atlantic by *dentex*, is represented in the Indo-Pacific by the analogous species *platessa* C. and V., *georgianus* C. and V., and *delicatissimus* Död., and future investigation of more abundant material may show that the Natal

"*dentex*" should really be assigned to one or other of the latter species.

**Caranx speciosus* (Forsk.).

1775. Forskal, Descr. Anim., vol. xii, p. 54.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 197, pl. xii.

1915. Ogilby, Mem. Queensl. Mus., vol. iii, p. 67, pl. xxi (synonymy).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 387 (references and synonymy).

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 209, pl. xxxi, fig. 3.

1925. Meek and Hildebrand, Field Mus. Nat. Hist., vol. xv, p. 361.

Depth $2\frac{1}{3}$–$2\frac{2}{3}$, length of head 3–$3\frac{1}{3}$, in length of body. Eye $3\frac{3}{5}$–5 in length of head, $1\frac{1}{3}$–$2\frac{1}{4}$ in snout, slightly smaller than interorbital width. Lower jaw shorter than upper. Teeth, none in adult; in young, sometimes minute granular teeth in jaws. Maxilla reaching to below front border of eye. Adipose eyelids feebly developed. Gill-rakers 19–21 on lower part of anterior arch. D I+VIII+I 19–21. A II+I 15–17. Soft dorsal and anal not falcate. Pectoral about as long as head. Scales: l.l. scutes 10–18, feebly armed, commencing below the posterior dorsal rays. Breast scaly.

Length.—Up to 900 mm.

Colour.—Silvery-golden, darker above, with 10–12 alternately broad and narrow vertical cross-bars, not quite reaching ventral profile, the bars becoming nearly or quite obsolete in the adult; sometimes a black opercular spot, fins yellowish, spinous dorsal and edge of soft dorsal dusky, tips of caudal lobes black.

Locality.—Zululand coast.

Distribution.—East coast of Africa, Indo-Pacific seas to Panama, W. and N.E. Australia.

Gen. Alectis Raf.

1815. Rafinesque, Analyse Nat., p. 84.

1896. Jordan and Evermann, Fish. N. and Mid. Amer., vol. i, p. 931.

1920. Nichols, Bull. Amer. Mus. Nat. Hist., vol. xlii, p. 285.

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 212.

Body ovate, deep, strongly compressed, more or less covered with minute embedded scales, the skin apparently naked. Teeth in villiform bands in jaws and on vomer, palatines, and tongue. Spinous

dorsal represented by short, rudimentary spines, disappearing more or less with age. Soft dorsal and anal equal, the anterior rays of both very elongate and filiform, becoming shorter with age. No detached finlets. Pectoral falcate. Ventrals long in young, shorter in adult. Lateral line curved, with scutes only on posterior portion on caudal peduncle. Adipose eyelids rudimentary.

Not essentially different from *Caranx*, but easily distinguished by the deep rhombic form, apparently naked skin, and filiform dorsal and anal rays. The change in form at different ages is often extremely great, and makes the differentiation of species often merely a matter of personal opinion.

The genus is found in all tropical seas.

Key to the South African species.

1. Preorbital less than diameter of eye . . . . . *ciliaris.*
2. Preorbital nearly twice diameter of eye . . . . . *indicus.*

Alectis ciliaris (Bl.).

Thread-fish.

1788. Bloch, Ichthyol., vol. vi, p. 29, pl. cxci.

1828. Rüppell, Atl. Fische, p. 129, pl. xxxiii, fig. 2 (*fasciatus*).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 200, fig. 78.

1915. Ogilby, Mem. Queensl. Mus., vol. iii, p. 88, pl. xxvii (references and synonymy).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 384 (references).

1920. Nichols, *loc. cit.*, p. 286.

1924. Wakiya, *loc. cit.*, p. 213, pl. xxxii, fig. 4; p. 214 (*indicus* C. and V. non Rüpp.); p. 215 (*temmincki*); p. 216, pl. xxiii (*breviventralis*).

1925. Meek and Hildebrand, Field Mus. Nat. Hist., vol. xv, p. 364.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 218 (*Blepharis c.*).

Depth 1 (young)–1$\frac{1}{3}$ (adult), length of head 2$\frac{1}{2}$–2$\frac{3}{4}$, in length of body. Eye 2$\frac{1}{2}$ (young)–3$\frac{1}{3}$ in length of head, equal to (adult) or greater than (young) snout. Profile almost evenly convex, with an occipito-nuchal prominence. Maxilla reaching to below anterior third of eye. Preorbital less than diameter of eye. Gill-rakers 3–15 on lower part of anterior arch. D VI+I 18–19. A II+I 15–16. Anterior 6 or 7 rays

of soft dorsal and anterior 4 or 5 of anal produced in long filamentous streamers, often several times the length of the body, becoming shorter in adult. Pectoral shorter than head in young, longer in adult. Ventral reaching anterior third of anal in young, not reaching origin of anal in adult. Scales: l.l. scutes 10–15, feeble and often very indistinct.

Length.—Up to 247 mm.

Colour.—Silvery, with 6–7 dark vertical bands on upper part of body in young, a dark opercular and supraorbital spot, the latter ill-defined; a dark blotch on bases of anterior soft rays; filamentous dorsal and anal rays black, except the 1st in each fin, which is white; ventrals black in young, other fins yellowish.

Locality.—False Bay, Agulhas Bank, Natal.

Distribution.—Circumtropical; *crinitus* from the Atlantic coast of N. America being considered synonymous.

Alectis indicus (Rüpp.).

Straight-nosed Thread-fish.

1788. Bloch, Ausl. Fische, vol. vi, pl. cxcii, fig. 1 (*gallus* non Linn.).

1828. Rüppell, Atl. Fische, p. 128, pl. xxxiii, fig. 1.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 145, pl. cclii, and p. 168, pl. ccliv (*major*=young).

1878–88. Day, Fish. India, p. 224, pl. li, fig. 3 (*gallus* non Linn.).

1908. Stead, Edible Fish. N.S.W., p. 88, pl. lviii (*gallus* non Linn.).

1915. Ogilby, Mem. Queensl. Mus., vol. iii, p. 83, pl. xxvi (references and synonymy).

1920. Nichols, *loc. cit.*, p. 286.

1924. Wakiya, *loc. cit.*, p. 217, pl. xxxiv, fig. 1 (*major*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 217 (*Scyris i.*).

Depth $1\frac{1}{4}$ (young)–$1\frac{9}{10}$, length of head $2\frac{2}{3}$ (young)–$3\frac{1}{2}$, in length of body. Eye $3\frac{1}{3}$ (young)–$4\frac{1}{2}$ in length of head, less than snout. Profile with an occipito-nuchal prominence, below which it is straight or even slightly concave. Maxilla reaching to below anterior margin of eye. Preorbital almost or quite twice diameter of eye. Gill-rakers 22–23 on lower part of anterior arch. D VI+I 19. A II+I 16. Anterior dorsal and anal rays filamentously produced, becoming shorter in adult. Pectoral equal to (young) or longer than head. Ventral very long in young, reaching to end of caudal; in

adult not reaching origin of anal. Scales : l.l. scutes 8–12, weak and often indistinct.

Length.—Up to 1000 mm.

Colour.—Silvery, bronzy above, with 5–6 more or less distinct dark vertical bands in young, a dark opercular spot, nuchal ridge black, filamentous dorsal and anal rays and ventral in young black, caudal yellowish.

Locality.—Delagoa Bay.

Distribution.—Indo-Pacific to Formosa and E. Australia.

A much larger species than *ciliaris*, and easily distinguished in all stages by the deeper preorbital and larger number of gill-rakers.

Gen. Vomer C. and V.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 189.

1896. Jordan and Evermann, Fish. N. and Mid. Amer., vol. i, p. 933.

1918. Nichols, Bull. Amer. Mus. Nat. Hist., vol. xxxviii, p. 669.

Body deeply ovate, strongly compressed, profile especially anteriorly sharp and trenchant, head gibbous above eye ; with minute embedded scales, skin apparently naked. Teeth minute in jaws, and on vomer, palatines, and tongue. Spinous dorsal with low and feeble spines, becoming to a large extent obsolete in adult, as do the two detached anal spines. Soft dorsal and anal low, not falcate. No finlets. Pectoral falcate. Lateral line curved, with some feeble scutes at posterior end. Adipose eyelids rudimentary.

Distinguished from the preceding genus by the low dorsal and anal fins, and from the similarly shaped genus *Selene* by the same character and by the presence of scutes on the caudal peduncle.

Tropical and temperate Atlantic and Pacific coast of America.

Nichols (*loc. cit.*) regards all the so-called species as geographical races of one species : *setipinnis*. The West African form is here given specific rank, distinguished by the slightly greater number of dorsal and anal rays.

Vomer dorsalis Gill.

1862. Gill, Proc. Ac. Nat. Sci. Philad., p. 436.

1896. Jordan and Evermann, *loc. cit.*, p. 934.

1914. Gilchrist and Thompson, Mar. Biol. Rep., vol. ii, p. 130, text-fig. (*Selene gibbiceps*).

1918. Thompson, *ibid.*, vol. iv, p. 101 (*Selene gibbiceps*).

1918. Nichols, *loc. cit.*, p. 669.

Depth $1\frac{1}{3}$–$1\frac{4}{5}$, length of head $2\frac{4}{5}$, in length of body. Eye $4\frac{1}{3}$ in length of head, 2 in snout. Profile prominently gibbous above eye, concave below. Maxilla reaching to below anterior nostril. Gill-rakers 32 on lower part of anterior arch. D VII–VIII+I 24–25. A II+I 19–20. Pectoral slightly longer than head. Scales : l.l. scutes about 18, very feebly armed.

Length.—Up to 200 mm.

Colour.—Silvery, darker above, nuchal ridge and an ill-defined blotch on opercle blackish, caudal yellowish green.

Locality.—Walfish Bay.

Distribution.—Senegal to mouth of Congo.

Type of *Selene gibbiceps* in South African Museum.

As regards the number of gill-rakers, this specimen resembles *declivifrons* Hildebr. 1925 from Panama, which is considered distinct from *setipinnis*, which has 24–27 gill-rakers (1925, Meek and Hildebrand, Field Mus. Nat. Hist., zool. ser., vol. xv, p. 367).

Gen. Trachynotus Lacép.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 78.

Body ovate-oblong, compressed, with small cycloid scales. Snout conical or blunt. Villiform teeth in jaws and on vomer and palatines ; becoming obsolete with age. Spinous dorsal of 6 low spines, connected by membrane in young, but free and often becoming obsolete in adult, preceded by a forwardly directed procumbent spine. Second dorsal and anal long, anteriorly more or less falcate. No finlets. Pectoral short. Lateral line without scutes, moderately curved. No keel on tail.

In the young the preopercle is armed with 3 large spines, which later are absorbed into the substance of the preopercle and disappear. The spinous dorsal is a perfect fin, but becomes obsolete in the adult. The teeth and pseudobranchiae also often disappear more or less completely with age. These young forms have been described under the names *Doliodon* and *Bothrolaemus*.

Pelagic fishes of the tropical and temperate seas, in many parts valued as food-fishes.

Key to the South African species.

1. Dorsal and anal not falcate . . . . . *glaucus.*
2. Dorsal and anal anteriorly falcate.
   - *a.* Body deep, uniform . . . . . *ovatus.*
   - *b.* Body ovate, with 3–5 indistinct spots . . . . . *russellii.*

**Trachynotus glaucus* (Linn.).

1766. Linné, Syst. Nat., ed. 12, vol. i, p. 494 (not *glaucus* Bloch).

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 358, pl. ccxxxiv.

1836. Valenciennes in Webb and Berthelot, Iles Canar. Poiss., p. 56, pl. xiii, fig. 1.

? 1889. Günther, Challeng. Rep., vol. xxxi, p. 9, pl. i, fig. G (young).

1896. Collett, Res. Sci. Camp. Monaco, fasc. x, p. 24.

1903. Regan, Ann. Mag. Nat. Hist., (7), vol. xii, p. 349.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 104.

1919. Fowler, Proc. U.S. Nat. Mus., vol. lvi, p. 199 (*Caesiomorus g.*).

Depth $2\frac{1}{2}$–3, length of head $3\frac{3}{4}$–4, in length of body. Eye less than snout, 4–$4\frac{3}{4}$ in length of head. Maxilla reaching to below anterior margin of eye. Snout conical. Gill-rakers 28–31 on lower part of anterior arch. D I+V–VI+I 24–27. A II+I 23–25. Soft dorsal and anal not strongly elevated or falcate anteriorly. Pectoral equal to length of head without snout. Lateral line very little curved above pectoral.

Length.—Up to 500 mm.

Colour.—Uniform dusky, darker above, or with indistinct vertically-ovate spots on sides; tips of soft dorsal and anal and of caudal lobes, black.

Locality.—Cape seas, Algoa Bay.

Distribution.—Mediterranean, West Africa, Ascension, St. Helena, Brazil.

Castelnau's statement that this fish is very rare in Cape waters seems to be perfectly true, as it has not been recorded since his time.

Jordan and Hubbs (1917, Ann. Carn. Mus., vol. xi, p. 463) have adopted Klein's genus *Glaucus* 1775 for this species. If accepted the family name will have to be changed to *Glaucidae.*

Trachynotus ovatus (Linn.).

Pampano.

1758. Linné, Syst. Nat., ed. 10, vol. i, p. 296.

1878–88. Day, Fish. India, p. 234, pl. li, fig. 2.

1916. Ogilby, Mem. Queensl. Mus., vol. v, p. 154, pl. xix (references and synonymy).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 391 (references and synonymy).

Body deeply ovate, dorsal profile strongly arched. Depth $1\frac{3}{4}$–2, length of head $3\frac{1}{3}$–4, in length of body. Eye 4–$4\frac{1}{2}$ in length of head, slightly less than snout. Snout very blunt, its anterior profile vertical. Maxilla reaching to below anterior margin of eye. Gill-rakers 12 (Ogilby, 9) on lower part of anterior arch. D I+VI+I 18–23. A II+I 16–20. Soft dorsal and anal more or less strongly falcate anteriorly. Pectoral $1\frac{1}{4}$–$1\frac{1}{2}$ in length of head. Lateral line gently curved.

Length.—Up to 760 mm.

Colour.—Silvery white, bluish above, lobe of soft dorsal and upper caudal lobe blackish.

Locality.—Natal, Delagoa Bay, Chinde.

Distribution.—Indo-Pacific to N.E. Australia.

Trachynotus russellii C. and V.

Moonfish.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 436 and p. 437 (*oblongus*).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 484 (*oblongus*).

1878–88. Day, Fish. India, p. 233, pl. 51B, fig. 3.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 187 (*oblongus*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 391 (*oblongus*).

Body ovate. Depth $2\frac{1}{3}$–$2\frac{2}{3}$, length of head $3\frac{1}{2}$, in length of body. Eye about 4 in length of head, and about equal to snout. Maxilla reaching to below centre of eye. Snout subconical. Gill-rakers 12–13 on lower part of anterior arch. D I+VI+I 22–23. A II+I 20–21. Soft dorsal and anal falcate anteriorly. Pectoral equal to length of head without snout. Ventrals reaching to vent. Lateral line nearly straight.

Length.—Up to 550 mm.

Colour.—Silvery white or yellowish, bluish or greenish above, 3–5 indistinct, dark, oval blotches on side above the lateral line; lobes of soft dorsal, anal, and caudal blackish.

Locality.—Natal coast.

Distribution.—Indian seas, East Indies.

Gen. Seriola Cuv.

1817. Cuvier, Règne Anim., ed. 1, p. 315.

1896. Jordan and Evermann, Fish. N. and Mid. Amer., vol. i, p. 901.

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 222.

Body oblong, moderately compressed, with small cycloid scales. Snout conical. Teeth villiform in bands in jaws, and on vomer, palatines, and tongue; the width in front of the band in upper jaw greater than that in lower jaw. Gill-rakers moderately numerous, well developed. Spinous dorsal of 5–7 low spines connected by membrane, preceded by a horizontal spine. Soft dorsal and anal slightly elevated, not, or only slightly, falcate anteriorly; the anal much shorter than soft dorsal, with the 2 preceding spines very small, obsolete in old specimens. No finlets. Pectoral short. Ventrals long, connected by a double membrane to centre and sides of belly. Lateral line without scutes, slightly curved, sometimes with a slight keel on caudal peduncle. Pyloric caeca numerous or very numerous (Cuvier and Valenciennes, 50; Wakiya, up to 500).

Moderate or large fishes inhabiting all warm and temperate seas, migratory in habits. They are of graceful build and powerful swimmers, and are valued as food and sporting fishes.

Owing to their wide distribution, it seems probable that many of the nominal species described by various authors will be united when a revision of the genus is undertaken.

Key to the South African species.

1. Upper part of opercle not scaly . . . . . *lalandii.*
2. Upper part of opercle scaly . . . . . *bonariensis.*

Seriola lalandii C. and V.

Yellow-tail, Geel-staart, Albacore, Halfcord.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 208.

1856. Pappe, Syn. Edib. Fish. C.G.H., p. 23 (*Scomber capensis*).

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 40 (*Lichia pappei*).

1916. Gilchrist, Mar. Biol. Rep., vol. iii, p. 9 (eggs).

1918. Thompson, *ibid.*, vol. iv, p. 101 (references and synonymy).

Head conical, profile not steep. Depth $3\frac{1}{2}$–4, length of head $3\frac{3}{4}$–$4\frac{1}{4}$ in length of body. Eye 5–6 in length of head, 2 in snout. Maxilla

reaching to below anterior border of eye, or a little further. Gill-rakers 14–15 on lower part of anterior arch. D I+VII+I 32–34. A II+I 20–22. Soft dorsal and anal not falcate anteriorly. Pectoral twice in length of head. Ventrals longer than pectoral, inserted below hind end of base of pectoral. Cheek, but not opercle, scaly.

Length.—Up to 1800 mm. (6 ft.).

Colour.—Silvery white, bluish above, with a yellow or golden longitudinal band from snout to caudal peduncle, dorsal and anal dusky, with yellowish margin, pectoral yellowish, ventrals and caudal yellow-olivaceous.

Locality.—Port Nolloth, Table Bay, False Bay, Agulhas Bank.

Distribution.—Tropical and temperate Atlantic.

Like all the members of this genus, this species is migratory, appearing on the Cape coasts from about October onwards throughout the summer. It is rare on the west coast, but appears in vast shoals in False Bay and off the Cape Point.

From an angling point of view it is one of the gamest fishes, and some interesting notes on this subject appeared in " Sporting World and Outdoor Life," April and May 1922, by C. L. Biden. The record catch appears to be one of 55 lb.

Seriola bonariensis C. and V.

Brazilian Yellow-tail.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 211.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 464.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321.

Head subconical. Depth a little over 3, length of head $3\frac{3}{5}$, in length of body. Eye nearly $1\frac{1}{2}$ in snout, $4\frac{1}{2}$ in length of head. Maxilla reaching to below anterior third of eye. Gill-rakers 17 on lower part of anterior arch. D I+VII+I 29(–31). A II+I 18(–21). Soft dorsal and anal slightly falcate anteriorly. Pectoral twice in length of head. Ventrals longer than pectoral, inserted below middle of base of pectoral. Cheeks and upper part of opercle scaly. No keel on caudal peduncle. Pyloric caeca about 20.

Length.—Up to 360 mm.

Colour.—Silvery white, darker bluish-grey above, a dark band from nape through eye to preorbital, more or less distinct; young usually with dark cross-bars.

Locality.—Natal coast.

Distribution.—Brazilian coast, West Indies, (? Mediterranean).

This species has been considered synonymous with *falcata* C. and V., and both of them with the Mediterranean *rivoliana* C. and V. (see Jordan and Evermann, Fish. N. and Mid. Amer., vol. i, p. 905, 1896, and Ribeiro, Arch. Mus. Nac. Rio Janeiro, vol. xvii, p. 30, 1915).

Its inclusion in the South African fauna-list rests solely on Norman's record, unless the specimen (360 mm.) above described belongs to this species. There is a close resemblance between this fish and the Hawaiian *sparna* Jenk. 1903, with which it may perhaps be more properly identified.

Gen. Zonichthys Swains.

1839. Swainson, Nat. Hist. Classif. Fish., vol. ii, p. 248.

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 230 (*Seriolina*).

Similar to *Seriola*, but the head about as deep as long, with strongly convex and steep profile, the snout short and blunt, scales largely concealed in the skin and visible only posteriorly, gill-rakers few, short, more or less knob-like and rudimentary, pyloric caeca comparatively few (about 20), width in front of the bands of teeth in upper and lower jaws equal.

A few species from the Indo-Pacific region and the West Indies.

Zonichthys nigrofasciata (Rüpp.).

Black-banded Yellow-tail.

1828. Rüppell, Atl. Fische, p. 92, pl. xxiv, fig. 2.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 215 (*binotata*), p. 216 (*ruppellii*), and p. 217 (*dussumieri*).

1844. Temminck and Schlegel, Fauna Jap. Poiss., p. 116 (*intermedia*).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 465.

1871. Klunzinger, Abh. Zool. Bot. Ges. Wien, vol. xxi, p. 450.

1878–88. Day, Fish. India, p. 227, pl. li, fig. 6.

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 230, pl. xxxviii, fig. 1 (*intermedia*).

Head as deep as long, profile strongly convex. Depth $2\frac{2}{3}$–3, length of head $3\frac{1}{4}$–$3\frac{1}{2}$, in length of body. Eye about equal to snout, 4–$4\frac{1}{2}$ in length of head. Maxilla reaching to below posterior third of eye. Width in front of bands of teeth in upper and lower jaws equal. Profile of snout steep, nearly vertical. Gill-rakers 8–9 on lower part of anterior arch, short and stout, the lower ones more or less rudimentary, none on upper part of arch. D I+V–VI+I 31–35.

A II+I 15–17. Soft dorsal and anal not falcate anteriorly. Pectoral $\frac{2}{3}$ length of head. Ventrals much longer than pectorals, especially in young, reaching to, or nearly to, vent. Skin smooth, scales visible only posteriorly. Pyloric caeca 20–22.

Length.—Up to 360 mm. (700 mm., Klunzinger).

Colour.—Yellowish, white below, bluish-grey above, uniform, but in the young with 5–7 dark irregular cross-bars, running obliquely forwards and downwards from above; fins olivaceous, tips of dorsal and anal blackish, upper (inner) surface of ventrals black, caudal yellowish, the lobes dark in young.

Locality.—Algoa Bay.

Distribution.—East coast of Africa, Indian seas, East Indies to Japan.

Wakiya (*loc. cit.*) places *intermedia* in a new genus *Seriolina*, characterised by the knob-like gill-rakers. He distinguishes, on what seem to me to be characters variable with age, *intermedia* from *nigrofasciatus*; but in any case both forms should be placed in the same genus, and for this purpose it would seem that *Zonichthys* Swainson 1839 is available.

Gen. Lichia Cuv.

1817. Cuvier, Règne Anim.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 255 (*Porthmeus*=young).

1903. Regan, Ann. Mag. Nat. Hist., (7), vol. xii, p. 348.

Body oblong, compressed, with small ovate, cycloid scales. Snout conical, more so in young than adult. Teeth villiform, in rather broad bands in jaws and on palatines, in a rhomboid or ovate patch on vomer and tongue. Gill-rakers few, stout. Spinous dorsal of 7 spines, connected by membrane in young, but free in adult, preceded by a horizontal spine. Soft dorsal and anal nearly equal in length, their anterior portions elevated and falcate. Pectoral short, ovate. Ventrals shorter than pectoral. Lateral line without scutes, running in an ascending curve above pectoral and in a descending curve in the middle of the side, becoming straight posteriorly; without keel on caudal peduncle. Pyloric caeca numerous.

A single species, widely distributed in the Atlantic Ocean, and of migratory habits.

The young were originally described as belonging to a different genus and species: *Porthmeus argenteus*.

Lichia amia (Linn.).

Leer-vis ; Garrick (Natal).

1766. Linné, Syst. Nat., ed. 12, vol. i, p. 495.

1833. Cuvier and Valenciennes, *loc. cit.*, vol. ix, p. 256, pl. cclxiv (*Porthmeus argenteus*).

1850. Cuvier, Règne Anim. Ill. Poiss., pl. liv, fig. 3.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 104 (references).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321.

Depth (between origin of soft dorsal and anal) $2\frac{2}{3}$–$3\frac{1}{2}$, length of head $3\frac{1}{2}$–$4\frac{1}{4}$. Eye 5–$5\frac{1}{2}$ in length of head, about $1\frac{1}{2}$ in snout. Lower jaw prominent. Maxilla reaching to below hind margin of eye, or a little beyond. Gill-rakers 7–9 on lower part of anterior arch. D I+VII+I 20–21. A II+I 20–21. Pectoral equal to postorbital part of head or a little longer. (Plate XXIII, fig. 2.)

The *Porthmeus* stage (up to about 100 mm.) has the greatest depth of the body between the spinous dorsal and ventrals, 3–$3\frac{1}{4}$ in length of body, length of head $2\frac{2}{3}$–3. Snout pointed, lower jaw very prominent. Eye $3\frac{1}{2}$–4 in length of head, greater than, or equal to, snout. Angle of preopercle with a spine, the lower and hinder margins with several denticulations ; all these are completely lost in adult ; in a specimen 100 mm. even the spine is practically obsolete. The anterior soft dorsal and anal rays are much less elevated than in adult, in very young scarcely elevated at all.

Length.—Up to 1800 mm. (6 ft.).

Colour.—Grey or plumbeous, passing into cream or white on belly, greenish or bluish on back, soft dorsal and anal greyish, the anterior portions darker, caudal plumbeous, pectoral and ventrals light, the lateral line distinctly, especially on the descending curve, outlined with black. The *Porthmeus* young is silvery, bluish above, with several more or less distinct dark, irregular cross-bands, which are frequently represented by oval or round spots, spinous dorsal black, soft dorsal and anal longitudinally banded with black, caudal and pectoral yellow, lateral line not outlined.

Locality.—Table Bay, False Bay, Agulhas Bank to East London and Natal.

Distribution.—Mediterranean and west coast of Africa ; occasionally extending to N.W. Europe.

The Leer-vis seems to arrive at the Cape somewhat later than the Yellow-tail (Biden, " Sporting World and Outdoor Life," April 1922, p. 12), and is found throughout the summer season in varying numbers

up to about May. The young (*Porthmeus*) are common at the same season and are frequently seen in the rock-pools along the shore of False Bay or washed up on the beach.

Gen. Naucrates Raf.

1810. Rafinesque, Carrat. Nuovi Gen., p. 44.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 247 (*Nauclerus*=young).

1844. Richardson, Voy. Erebus and Terror Fish., p. 52 (*Xystophorus*=young).

1880. Lütken, Spolia Atlant., p. 504 (young stages).

Body elongate-oblong, not much compressed, with small cycloid scales. Snout somewhat blunt. Teeth villiform, in bands in jaws and on vomer, palatines, and tongue. Gill-rakers moderate in number. Spinous dorsal of 4–5 low, disconnected spines in the adult; in the young the spines are connected by membrane. Soft dorsal and anal slightly elevated anteriorly, the latter much shorter than former. Pectoral short, ovate. Ventrals a little longer than pectoral. Lateral line without scutes, gently curved; a strong keel on either side of caudal peduncle. Pyloric caeca moderate in number.

A single cosmopolitan species in tropical and temperate seas.

The young stages (*Xystophorus* and *Nauclerus*) not only have a perfect spinous dorsal fin, but are without the keel on the caudal peduncle; like the young of several other members of this family they have spinous processes on the supraorbital, suprascapula, and preopercle.

Naucrates ductor (Linn.).

Pilot-fish; Lootsman.

1758. Linné, Syst. Nat., ed. 10, p. 295.

1878–88. Day, Fish. India, p. 229, pl. li, fig. 2.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 102 (references and synonyms).

1918. Gilchrist, Ann. Mag. Nat. Hist., (9), vol. ii, p. 114 (eggs and spawning habits).

1922. Norman, *ibid.*, (9), vol. ix, p. 321.

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 38, fig. 2 (*indicus*).

1926. McCulloch, Rec. Austr. Mus., vol. xv, p. 34, pl. i (young).

Depth $3\frac{1}{2}$ (adult ♀)–$4\frac{1}{3}$, length of head $3\frac{1}{2}$–$3\frac{4}{5}$, in length of body. Eye 6–$6\frac{1}{3}$ in length of head, about 2 in snout. Maxilla reaching to below

anterior border of eye. Gill-rakers 16–17 on lower part of anterior arch. D IV(III–V)+I 26–28. A II+I 16–17. Pectoral equal to postorbital part of head.

Length.—Up to 600 mm.

Colour.—Silvery, blackish or bluish above, with 5–7 broad, dark vertical bars, the hinder ones extending on to the soft dorsal and anal fins, tip of pectoral dark, tips of caudal lobes light.

Locality.—Off Table Bay, Agulhas Bank, Natal coast.

Distribution.—Cosmopolitan, pelagic.

The Pilot-fish has become one of the best-known fishes through the writings of numerous travellers and naturalists. In its young stages it swims about under and in the neighbourhood of jelly-fishes, Portuguese Men-of-war (*Physalia*), Turtles, floating wreckage, and Sargasso weed. The adults, however, seem to prefer the company of sharks or ships, which they follow with great persistency, the customary explanation being that the association with sharks rested on a mutual benefit whereby the Pilot-fish obtained scraps of food in return for piloting the shark to the food.

A far more plausible explanation has been put forward by Gilchrist (*loc. cit.*) based on the character of the eggs. It was found that each egg was furnished with a long filament and that by means of these filaments the eggs hung together and adhered to objects with which they came in contact. Gilchrist therefore suggested that the eggs were laid so as to adhere to the skin of the shark or other object, and that the anxiety of the Pilot-fish to keep close to the shark was due to solicitude for its eggs similar to that exhibited by Blennies and other fishes which guard their eggs.

This very plausible suggestion is, however, discountenanced by an observation on the structure of the egg, diametrically opposed to that given by Gilchrist. A ripe female received at the Museum was found to contain eggs which possessed no filaments, but, on the other hand, possessed an oil-globule and floated in sea-water. They were, therefore, typical pelagic eggs (Barnard, " Nature," vol. cxviii, 14th Aug. 1926).

No explanation of these opposing observations has yet been given, and the question can only be solved by the examination of further material.

Gen. Elagatis Benn.

1840. Bennett, F. D., Narr. Whaling Voy., vol. ii, p. 283.

1854. Bleeker, Nat. Tyds. Ned. Ind., vol. vi, p. 196 (*Seriolichthys*).

Body elongate, with small cycloid scales. Snout pointed. Teeth villiform in jaws, and on vomer and palatines. Gill-rakers in moderate number. Spinous dorsal of 6 low spines connected by membrane. Soft dorsal and anal slightly elevated anteriorly, the latter shorter than former, each with 1 detached finlet (composed of 2 rays) behind. Anal spines almost or quite obsolete. Pectoral short, ovate. Ventrals of about same length as pectoral. Lateral line without scutes, very slightly curved ; no keel on caudal peduncle.

A single circumtropical species.

Elagatis bipinnulatus (Q. and G.).

Runner ; Prodigal Son.

1824. Quoy and Gaimard, Voy. Uranie Zool., vol. i, p. 363, pl. lxi, fig. 3.

1876. Günther, Fische d. Südsee, vol. ii, p. 136, pl. xc, fig. 13.

1878–88. Day, Fish. India, p. 228, pl. li, A, fig. 1.

1907. Stead, Add. Fish Fauna, N.S.W., No. 1, p. 17, pl. v.

1918. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 390 (references).

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 233, pl. xxxvii, fig. 2.

1925. Meek and Hildebrand, Field Mus. Nat. Hist., zool. ser., vol. xv, p. 393.

Depth $3\frac{3}{5}$–$4\frac{1}{6}$, length of head $3\frac{3}{5}$ to nearly 4, in length of body. Eye $5\frac{1}{2}$–$5\frac{4}{5}$ in length of head, 2 in snout. Maxilla reaching to vertical from midway between nostrils and front margin of eye. Gill-rakers 26 on lower part of anterior arch. D VI+I 25–27+2. A (II)+I 17+2. Pectoral about $\frac{1}{2}$ length of head. Scales : l.l. 95–105 ; l.tr. $\frac{12-16}{28}$.

Length.—Up to 1000 mm.

Colour.—Yellowish, plumbeous or bluish above, 2 blue longitudinal bands along sides, caudal yellow.

Locality.—Natal coast.

Distribution.—Circumtropical.

Gen. Chorinemus C. and V.

1800. Lacépède, Hist. Nat. Poiss., vol. ii, pl. xx, fig. 3 (*Scombéroïde commersonnien*, figure only).

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 367.

Scomberoides cannot be accepted, not for the reason given by Cuvier

and Valenciennes (liable to confusion with *Scomber* or *Scombroidei*), nor because it is based only on a figure (though an easily recognisable figure) without locality, but for the intrinsic reason that the words in the caption of the figure were used in a popular sense, were not Latinised, and are not comparable with *e.g.* " Les Trachinotes," which latter term was used with a definite generic conception.

Body elongate-oblong, compressed, with small elongated scales, more or less embedded in the skin. Snout conical. Premaxilla not protractile, except in young. Teeth villiform, in bands in jaws and on vomer, palatines and tongue ; small canines sometimes present in front of jaws. Gill-rakers in moderate number. Spinous dorsal of 6–7 spines, connected by membrane in young, but nearly free in adult, preceded by a horizontal forwardly directed spine. Soft dorsal and anal equal in length, anterior rays rather elevated, posterior rays penicillate and nearly or quite disconnected to form finlets. Anal spines strong. Pectoral short, ovate. Ventrals about as long as pectoral, connected to middle line of belly and depressible in a groove. Lateral line without scutes, slightly but somewhat angularly curved above pectoral ; no keel on caudal peduncle.

A few species of circumtropical distribution.

Key to the South African species.

1. Maxilla extending well behind eye . . . . . *lysan.*
2. Maxilla not extending beyond hind margin of eye.
   a. Scales lanceolate . . . . . *sancti-petri.*
   b. Scales needle-like . . . . . *tol.*

Chorinemus lysan (Forsk.).

1775. Forskal, Desc. Anim., No. 67, pl. liv.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 392 (references).

1919. Regan, *ibid.*, vol. ii, pt. 4, p. 198.

1924. Wakiya, Ann. Carn. Mus., vol. xv, p. 238.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 213.

Depth about 3, length of head $4\frac{1}{3}$–$4\frac{2}{3}$, in length of body. Eye 4–5 in length of head, equal to or rather greater than snout, which is rather blunt. Usually a few canines in front of jaws. Maxilla scarcely widened behind, rounded, extending well beyond hind margin of eye. Gill-rakers 11 on lower part of anterior arch. D I+VII+I 19–20. A II+I 18. Scales lanceolate.

Length.—Up to 1000 mm.

Colour.—Silvery white, bluish above, 6–8 dark oval spots along side, fins pale greyish, pectoral yellowish.

Locality.—Natal coast, Delagoa Bay, Chinde.

Distribution.—Indo-Pacific to Japan.

Chorinemus sancti-petri C. and V.

Five-fingers ; Queenfish ; Sanct Pieter Vis.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss, vol. viii, p. 379, pl. ccxxxvi.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 331 (synonymy).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 186.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 392 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 213.

Depth $3\frac{1}{3}$–$3\frac{3}{4}$, length of head $4\frac{1}{3}$–$4\frac{1}{2}$, in length of body. Eye $4\frac{1}{2}$–$5\frac{1}{2}$ in length of head, $1\frac{1}{2}$–$1\frac{3}{4}$ in snout, which is moderately pointed. Canines absent in adult, small in young ; vomerine teeth in a triangular or pear-shaped patch. Maxilla widened posteriorly, truncate, extending to below hind margin of eye. Gill-rakers 16–17 on lower part of anterior arch. D I+VII+I 20–21. A II+I 18–19. Scales lanceolate.

Length.—Up to 600 mm.

Colour.—Silvery white, bluish above, a bluish band from occiput to pectoral, a series of 6–8 small dark, oval spots above, and a second series of 3–5 less-distinct spots below the lateral line, fins yellowish, a blackish blotch on the elevated portion of soft dorsal, tips of caudal lobes usually dusky.

Locality.—Natal coast, Delagoa Bay, Mozambique.

Distribution.—Indo-Pacific to Japan and Australia.

The synonymy of this species is in some confusion, and besides Sauvage (*loc. cit. supra*) reference should be made to Weber (1913, Siboga Exp. Monogr., 57, p. 390). The description given above is based entirely on South African specimens.

Chorinemus tol C. and V.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss,. vol. viii, p. 385.

1913. Weber, Siboga Exp. Monogr., 57, p. 390 (synonymy).

Depth $3\frac{5}{8}$–$4\frac{1}{4}$, length of head $4\frac{1}{2}$, in length of body. Eye $5\frac{1}{4}$–$5\frac{1}{2}$ in length of head, $1\frac{2}{3}$ in snout, which is pointed. A few of the front teeth

in jaws slightly enlarged. Maxilla expanded posteriorly, truncate, reaching to below centre of eye, or hind margin of pupil. Gill-rakers 19–20 on lower part of anterior arch. D I+VII+I 19–20. A II+I 17–18. Scales needle-like, giving the skin a striated appearance.

Length.—Up to 500 mm.

Colour.—Silvery white, bluish above, 6–8 oval, dark, but often indistinct, spots, the anterior ones cut by the lateral line, fins yellowish tips of elevated portion of dorsal blackish.

Locality.—East London, Natal coast, Delagoa Bay.

Distribution.—Indo-Pacific.

The synonymy of this species is also confused. The above description is based on South African specimens only. The species is easily distinguished from the other two species found along our coasts, by its more slender body and needle-like scales.

Gen. Apolectus C. and V.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 438 (non Bennett, 1831).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 397 (*Stromateus* part).

Body ovate, compressed, with scales. Teeth small, in a single row in jaws; none on palate or tongue. A single long dorsal fin, with rudimentary spines anteriorly. Anal long. No detached finlets. Pectoral falcate. Ventrals jugular in young, obsolete in adult. Lateral line curved, with a few keeled scales posteriorly on the caudal peduncle. No adipose eyelids.

This genus was regarded by Günther as a synonym of *Stromateus*, but lacks the characteristic pharyngeal teeth of the *Stromateidae*, and in all essentials is a Carangid. Cuvier and Valenciennes recognised its affinity to *Trachynotus*. Fowler includes it in the *Carangidae*, though Jordan (Classif. Fish, p. 184) places it in a separate family, *Apolectidae*, adjoining the *Carangidae*.

Apolectus niger (Bl.).

1785. Bloch, Ichthyol., vol. xii, p. 93, pl. cdxxii.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss, vol. viii, p. 439, pl. ccxxxviii (*Apolectus stromateus*).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 401.

1878–88. Day, Fish. India, p. 247, pl. liii, fig. 4.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 218.

Depth 2–2½, length of head 4, in length of body. Eye 4¼–6⅛ in length of head, 1¼–2 in snout. Maxilla reaching to below anterior margin of eye. Gill-rakers 14 on lower part of anterior arch. D (II–V) 42–46. A (II) 35–39. Dorsal and anal scaly, the anterior portion elevated, more or less falciform, especially in young. Pectoral longer than head. Scales : l.l. 110–120.

Length.—Up to 600 mm.

Colour.—Deep brown, greyish or purplish-grey, dorsal and anal with black margins, caudal grey with dark margin ; in young, caudal yellow with 1–3 black cross-bars.

Locality.—Natal coast.

Distribution.—Indian seas, East Indies to China.

An excellent edible fish. Distinguished from the true *Stromateus* (Butterfish) by the coloration, slight keel on caudal peduncle, and falcate pectoral.

Fam. 23. Coryphaenidae.

Body elongate, strongly compressed in adult, with small cycloid scales. Forehead elevated in adult male. Mouth large, oblique, not protractile. Maxilla narrow. Teeth cardiform in jaws and on vomer and palatines ; villiform on tongue. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae absent. A single long dorsal fin, not strongly elevated, without spines. Anal similar, but shorter. Pectoral short. Ventrals thoracic, of a spine and 5 rays, without axillary process, and partly received into an abdominal groove. Caudal strongly forked. Air-bladder absent. Pyloric caeca very numerous. Lateral line distinct, somewhat angularly bent above pectoral.

A single genus, with two species of large, powerful, widely distributed pelagic fishes.

Gen. Coryphaena Linn.

1758. Linné, Syst. Nat., ed. 10, p. 261.

With the family characters.

Coryphaena hippurus Linn.

Dolphin-fish.

1758. Linné, *loc. cit.*, p. 261.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 278, pl. cclxvi.

1878–88. Day, Fish. India, p. 248, pl. liii.

1895. Goode and Bean, Ocean. Ichthyol., p. 209, figs. 219, 220, 220*a*, 220*b*.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 121 (references and synonymy).

Depth of body about equal to length of head, $4\frac{1}{2}$–$5\frac{1}{2}$ in length of body. Eye 5–$6\frac{1}{2}$ in length of head, 2 in snout. Maxilla reaching to below centre or posterior margin of eye. Profile of head nearly vertical in adult male, less elevated in female and not at all in young. D 55–65. A 25–27. Ventrals inserted below base of uppermost pectoral ray. (Plate XXVI, fig. 1.)

Length.—Up to 1800 mm. (6 ft.).

Colour.—Greenish or bluish, darker above, with golden iridescence, belly whitish, with a yellowish or golden band, small black or dark blue spots scattered over the body, dorsal and anal dark bluish, caudal yellowish.

Locality.—Cape seas, Table Bay, False Bay.

Distribution.—Mediterranean, Atlantic, Indo-Pacific.

The young is cylindrical, less compressed and without the ridge-like profile of the head. The eye is relatively large, greater than the snout. There are irregular, dark, vertical cross-bars on the body.

The changes in form, from the young up to the adult, have been described by Lütken (1880, Spolia Atlantica *), who has also detailed the specific differences between this species (the Large Dolphin-fish) and the Lesser Dolphin-fish (*C. equisetis* Linn.).

The Dolphin-fish is a very powerful swimmer and preys on the Flying-fish and other fishes which congregate in shoals. The flesh is excellent eating.

Fam. 24. Sciaenidae.

Meagres, Drums, Croakers.

Body oblong or rather elongate, with cycloid or more or less ctenoid scales. Mouth moderate or rather large, somewhat protractile. Maxilla wholly or partly concealed under preorbital, without supplemental bone. Subocular shelf, if present, slender. Teeth usually villiform, with or without an enlarged series or canines; none on vomer, palatines, or tongue. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae usually present. Dorsal

* A translation, without figures, is given in Ann. Mag. Nat. Hist., (5), vol. vii, pp. 1–14, 107–123, 1881.

fin deeply notched or divided into spinous and soft portions, the latter much the longer. Anal typically much shorter than soft dorsal, spines 1 or 2. Ventrals thoracic, of a spine and 5 rays, with or without axillary process. Caudal variable, never forked. Air-bladder usually present, usually large with lateral processes. Pyloric caeca usually few. Lateral line single, the tubes often branched.

A large family of warm-water fishes which are important from an economic point of view. Most of the species are of rather large size, though the flesh is not everywhere regarded as of the highest quality ; the large size of the air-bladder makes it valuable for the manufacture of isinglass, though of an inferior quality. They are also good sporting fishes.

An interesting peculiarity of many of the species is their power of producing sounds which can be often plainly heard when the fish is some distance below the surface. The production of this noise, which has been termed " drumming," and which has given rise to various names for these fishes, such as Drums, Croakers, Grunters, is usually considered to be due to muscular action on the air-bladder.

The species of this family are present in all warm seas, except around the Pacific Islands. Some frequently enter estuaries and rivers, but none are deep-water dwellers.

Key to the South African genera.

1. No barbels on chin.
   - *a.* Pores on chin . . . . . *Sciaena.*
   - *b.* No pores on chin
     - i. Canines in front of both jaws . . . . . *Otolithus.*
     - ii. Canines in upper jaw only . . . . . *Cynoscion.*
     - iii. No canines . . . . . *Atractoscion.*

2. A single barbel on chin . . . . . *Umbrina.*

Gen. Sciaena (Artedi) Linn.

1758. Linné, Syst. Nat., ed. 10, p. 289.

1911. Jordan and Thompson, Proc. U.S. Nat. Mus., vol. xxxix, p. 244.

1918. Ogilby, Mem. Queensl. Mus., vol. vi, p. 69.

Body more or less elongate. Cleft of mouth usually oblique. Snout usually with conspicuous pores or slits. Similar pores on chin. No barbels. Lower jaw equal to upper, or slightly shorter. Bands of teeth in jaws villiform with the outer (upper jaw) and inner (lower jaw) rows enlarged, but no true canines. Gill-rakers few. Pseudo-

branchiae present. Dorsal deeply notched. Outer ray of ventral often prolonged as a filament in young. Caudal varying, truncate, rounded, rhomboid. Lateral line tubes simply bifurcate or many-branched. Air-bladder present.

Attempts to subdivide the genus (*Pseudosciaena*, *Corvina*, *Johnius*, etc.) have not been very successful owing to the intergrading of characters.

Key to the South African species.

1. Tubes of the lateral line arborescent.
   - *a.* Anal spines weak . . . . . *hololepidota.*
   - *b.* Anal spines strong . . . . . *soldado.*
2. Tubes of the lateral line bifurcate.
   - *a.* Enlarged teeth in both jaws . . . . . *vogleri.*
   - *b.* Enlarged teeth in upper jaw only . . . . . *belengeri.*

Corvina stellifer Bl., a West Indies and Brazilian species, is not admitted here, as it seems probable that Bloch erroneously gave the Cape as the locality of his original specimen. It has never been authentically recorded from South African waters.

Corvina punctata Cast. 1861 is not a Sciaenid at all, as it has three anal spines.

Sciaena hololepidota (Lacép.).

Kabeljaauw (Cape) ; *Cob* (East London) ; *Salmon-bass* (Natal).

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 517, pl. xxi, fig. 2.

1803. *Id.*, *ibid.*, vol. v, p. 685 (*aquila*).

1849. Smith, Ill. Zool. S. Afr. Pisc., pl. xv.

1875. Haly, Ann. Mag. Nat. Hist., (4), vol. xv, p. 269 (*margaritifera*).

1903. Gilchrist, Mar. Invest. S. Afr., vol. ii, p. 191 (egg).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 349 (references), and p. 350 (*margaritifera*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 76 (references).

1918. Ogilby, Mem. Queensl. Mus., vol. vi, p. 70, pl. xxi (subsp. *antarctica*).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 16 (*aquila*).

Depth $3\frac{2}{5}$–$3\frac{9}{10}$, length of head $3\frac{1}{4}$–$3\frac{1}{2}$, in length of body. Eye $4\frac{1}{2}$ (young)–$7\frac{1}{2}$ (adult) in length of head, 1 (young)–2 (adult) in snout, less than interorbital width. Maxilla reaching to below centre of eye, or a little beyond, not completely concealed beneath preorbital. Teeth in narrow bands, uniserial posteriorly, the outer row in upper jaw, the inner in lower jaw, enlarged, conical. Upper jaws slightly overlapping lower. Angle of preopercle serrulate in young. Gill-rakers

9–10 and a few rudiments on lower part of anterior arch. D X . I 27–28, 1st short, 3rd or 4th spine longest, soft dorsal not scaly. A II 7, 2nd spine weak. Caudal rounded in young, subtruncate in adult. Scales ctenoid : l.l. 51–55 (excluding those on caudal fin) ; l.tr. $\frac{8-9}{20-22}$ (11–12 above if counted obliquely). Lateral line tubes with several branches. Pyloric caeca 8–10. (Plate XXIII, fig. 3.)

Length.—Up to 1600 mm.

Colour.—Silvery, iridescent bluish or greenish above, white on belly, the silvery lustre less noticeable in large examples, which are more greyish ; young often with oblique dark stripes above the lateral line corresponding with the series of scales ; fins greyish, ventrals white, axil of pectoral blackish.

Locality.—Luderitzbucht and west coast to Table Bay, False Bay to Natal and Delagoa Bay, down to 200 fathoms.

Distribution.—N. and S. Atlantic, Mediterranean, Madagascar, Mauritius, and E. coast of Australia.

Type of *margaritifera* in British Museum.

This species is known in Europe as the Meagre or Maigre, and in Australia as the Jew-fish. It is everywhere regarded as a valuable food-fish, though large examples tend to become coarse. The Australian fish has been given the subspecific title *antarctica* Cast., but there are no specific differences between it and the Atlantic form. Lacépède first described the species from Mauritius.

On the French coasts it is protected by law.

At the Cape the Kabeljaauw is one of the most important fishes economically. Adults appear mostly during the winter months, and spawning takes place from October to December ; immature fishes are abundant during the summer months and often enter the mouths of rivers in pursuit of the shoals of Harders, Sardines, Maasbankers, etc.

**Sciaena soldado* (Lacép.).

1802. Lacépède, Hist. Nat. Poiss., vol. iv, pp. 344, 390.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 94 (*miles*).

1855. Peters, Wiegm. Arch., p. 242 (*dorsalis*).

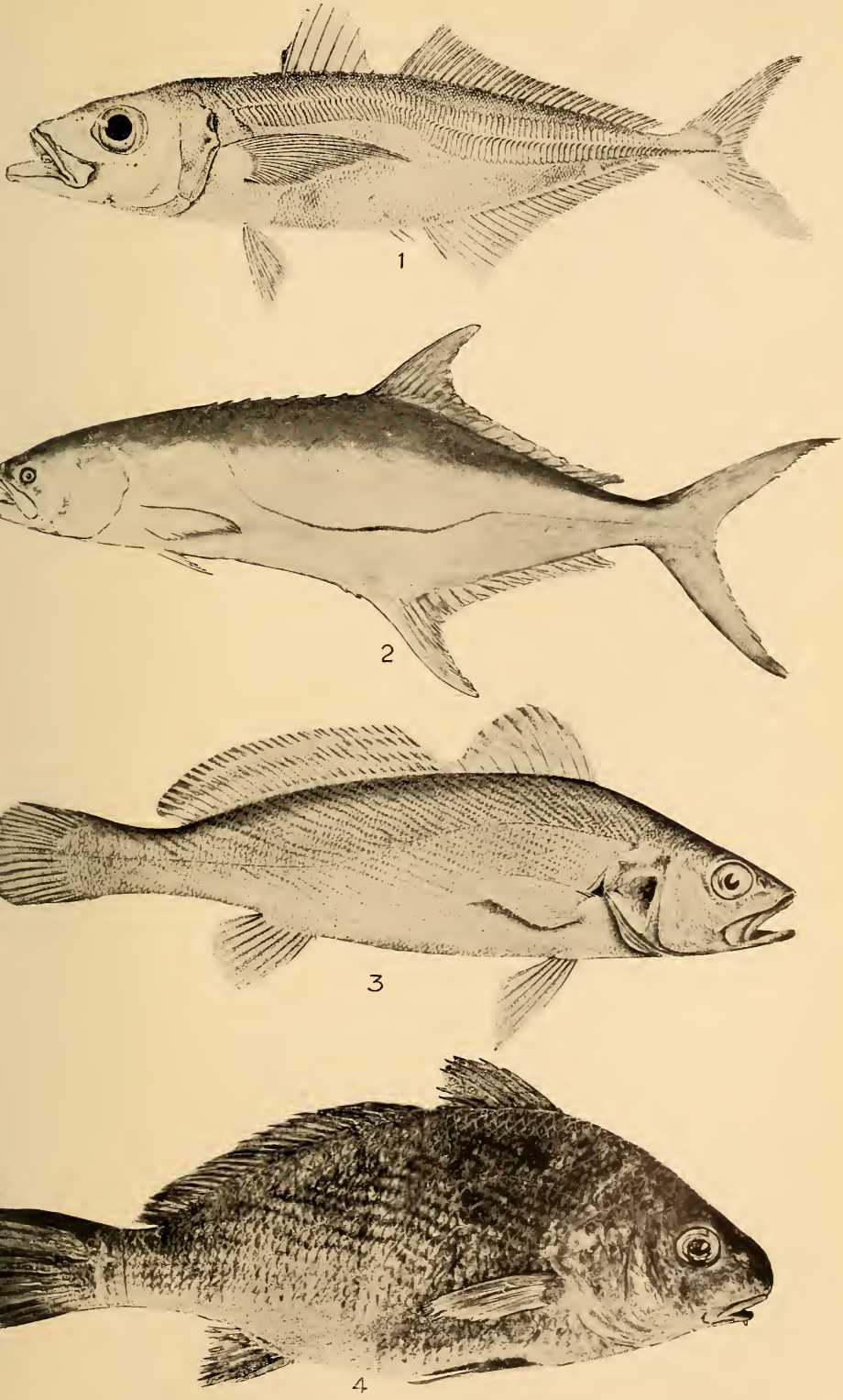
1876. Bleeker, Atl. Ichth., vol. ix, pl. ccclxxxv, fig. 3 (*miles*).

1878–88. Day, Fish. India, p. 185, pl. xliii, fig. 5 (*miles*) (synonymy).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 350, pl. xvii, fig. 3 (*dorsalis*).

PLATE XXIII.

FIG.		TEXT-PAGE
1.	*Trachurus trachurus* Linn. (after C. and V.)	531
2.	*Lichia amia* (Linn.) (original photo)	559
3.	*Sciaena hololepidota* (Lac.) (after Ogilby)	569
4.	*Umbrina capensis* Pappe (original photo)	578



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1918. Ogilby, Mem. Queensl. Mus., vol. vi, p. 81, pl. xxiv (synonymy).

? 1925. Fowler, J. Bomb. Nat. Hist. Soc., vol. xxx, p. 320 (*miles*).

Depth 3–3⅓, length of head 3½–3⅔, in length of body. Eye 4½–5 in length of head, equal to interorbital width, less than snout. Maxilla reaching to below posterior third of eye, completely concealed under preorbital. Snout not overhanging upper jaw, which equals lower. Teeth villiform, with an enlarged series in both jaws. Angle of preopercle serrulate. Gill-rakers 8, with some rudiments, on lower part of anterior arch. D IX–X . I 27–32, 1st spine very short, 2nd and 3rd longest, soft dorsal scaly at base. A II 7, 2nd spine very strong and nearly as long as first ray. Caudal wedge-shaped. Scales ctenoid : l.l. 48–51 ; l.tr. $\frac{8}{16}$. Lateral line tubes with several branches.

Length.—Up to 600 mm.

Colour.—Silvery, darker above, belly white ; margins of fins, except ventrals, usually dark.

Locality.—Quilimane, Portuguese East Africa.

Distribution.—Indian seas, East Indies, S. and E. Australia.

It is doubtful whether Fowler's description applies to the true *soldado*. He gives the number of gill-rakers as 15, and there are several other points of difference between his description and those of Day and Ogilby.

Sciaena vogleri (Blkr.).

Lesser Salmon-bass.

1853. Bleeker, Nat. Tijds. Ned. Ind., vol. iv, p. 253.

1874. *Id.*, Verh. Ak. Amsterd., vol. xiv, p. 35.

1876. *Id.*, Atl. Ichth., vol. ix, pl. ccclxxxvi, fig. 4.

1878–88. Day, Fish. India, p. 186, pl. xlv, fig. 1.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 183 (*parva*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 350 (*parva*).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 319 (*marleyi*).

1922. *Id.*, *ibid.*, p. 321.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 247 (*parva* and *marleyi*).

Depth about equal to length of head, 3–3½ in length of body. Eye 4½–4⅔ in length of head, equal to or less than snout, and interorbital

width. Maxilla reaching to below centre of eye, completely concealed under preorbital. Teeth villiform, with an outer enlarged row in both jaws. Upper jaw slightly longer than lower, snout rounded but not overhanging upper jaw. Angle of preopercle finely serrulate. Gill-rakers 12 and some rudiments on lower part of anterior arch. D X . I 27–31, 1st spine very short, 2nd–4th subequal, base of soft dorsal scaly. A II 7, 2nd spine stout. Caudal wedge-shaped (rhomboid). Scales ctenoid : l.l. 48–50 ; l.tr. $\frac{6}{14}$. Lateral line tubes bifurcate. Pyloric caeca 7–9.

Length.—Up to 270 mm.

Colour.—Silvery, darker above, spinous dorsal blackish, especially at margin, soft dorsal and caudal dark grey, a dark axillary spot sometimes present.

Locality.—Pondoland and Natal coast, Delagoa Bay, down to 50 fathoms.

Distribution.—Indian seas, East Indies.

Type of *parva* in South African Museum ; of *marleyi* in British Museum.

The very similar *S. sina* C. and V. is recorded from Delagoa Bay (Fowler, 1925, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 247). From Day's (Fish. Ind., p. 186) descriptions of the two species it is difficult to find any specific differences, though the figure of *sina* shows a rather more prominent or inflated snout.

**Sciaena belengeri* (C. and V.).

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 120 and p. 122, pl. cvii (*lobata*).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 303.

1878–88. Day, Fish. India, p. 191, pl. xliv, fig. 5.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321.

Depth about equal to length of head, $3\frac{1}{2}$–$3\frac{2}{3}$ in length of body. Eye $3\frac{1}{2}$–$3\frac{3}{4}$ in length of head, about equal to snout, and to interorbital width. Maxilla reaching to below centre of eye, completely concealed under preorbital. Teeth villiform, with an enlarged series in upper jaw, but none in lower. Snout rounded and overhanging upper jaw, which is slightly longer than lower. Angle of preopercle serrulate. D IX–X . I 27–32, 1st spine very short, 2nd and 3rd longest, soft dorsal scaly at base. A II 7, 2nd spine stout. Caudal wedge-shaped.

Scales ctenoid : l.l. 48–52 ; l.tr. $\frac{6}{14}$. Lateral line tubes bifurcate. Pyloric caeca 5(8).

Length.—Up to 200 mm.

Colour.—Silvery, darker above, often some dark blotches on back (*lobata*) ; dorsal, caudal, and anal fins black, opercle with a dark blotch.

Locality.—Natal coast.

Distribution.—Indian seas, East Indies.

Gen. Otolithus Cuv.

1829. Cuvier, Règne Anim., ed. 2., vol. ii, p. 172.

1918. Ogilby, Mem. Queensl. Mus., vol. vi, p. 62.

Body more elongate as a rule than in *Sciaena*. Cleft of mouth oblique. Pores on snout, but none on chin. No barbels. Lower jaw projecting beyond upper. Maxilla completely (or almost) concealed under preorbital. Bands of villiform teeth in jaws (anteriorly only in lower jaw) with an enlarged series, two strong curved canines in upper jaw and one (median) in lower jaw, an additional smaller one often present alongside one or other of the canines. Gill-rakers few. Pseudobranchiae present. Dorsal deeply notched. Caudal rhomboid or rounded. Lateral line tubes simply bifurcate or arborescent. Air-bladder present.

As here used in the restricted sense, the genus is distributed over the Indian and Western Pacific Oceans.

Otolithus ruber (Schn.).

Long-toothed Salmon-bass.

1801. Bloch Schneider, Syst. Ichth., p. 75, pl. xvii.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 60, pl. cii.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 350 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 246.

Depth $3\frac{1}{2}$–4, length of head 3–$3\frac{1}{3}$, in length of body. Eye 5–6 in length of head, 1–$1\frac{1}{2}$ in snout and in interorbital width. Maxilla reaching to below posterior third of eye, completely concealed, except lower hind angle, under preorbital. Preopercular margin serrulate. Gill-rakers 10 on lower part of anterior arch. D X . I 28–30, 1st spine short, 3rd longest. A II 7, spines weak. Caudal rhomboid in young,

more rounded in adult. Scales ctenoid : l.l. 50–54 ; l.tr. $\frac{7}{16\text{–}17}$. Lateral line tubes strongly arborescent. Pyloric caeca 5.

Length.—Up to 750 mm.

Colour.—Silvery, darker above, with reddish sheen.

Locality.—Natal and Zululand coast, Delagoa Bay, Chinde.

Distribution.—Indian seas, Malay Archipelago.

Day states that the shoulder-flap or scale is entire, but this is surely an error.

Gen. Cynoscion Gill.

1862. Gill, Proc. Ac. Nat. Sci. Philad., p. 18.

Body elongate. Cleft of mouth oblique. Snout with pores. No barbels. Lower jaw projecting. Teeth in narrow bands, with 1–2 canines in upper jaw ; no canines in lower jaw. Gill-rakers few, strong. Pseudobranchiae present. Dorsal deeply notched. Last ray of anal nearly opposite last ray of dorsal. Caudal truncate or emarginate. Air-bladder present.

Chiefly in American waters, where on account of their tender flesh they are known as Weak-fishes. Distinguished from *Otolithus* by the absence of canines in lower jaw.

**Cynoscion nebulosus* (C. and V.).

Courbina ; Spotted Weak-fish (America).

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 79.

1898. Jordan and Evermann, Fish. Mid. N. Amer., vol. ii, p. 1409, fig. 563 (synonymy).

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 44.

Depth 4, length of head $3\frac{1}{3}$, in length of body. Eye $6\frac{1}{2}$ in length of head. Maxilla reaching to below hind margin of eye. Gill-rakers 7 on lower part of anterior arch. D X . I 25–27, 3rd and 4th spines longest. A II 10, spines weak. Scales : l.l. 70–75 ; l.tr. $\frac{10}{11}$.

Length.—Up to 350 mm.

Colour.—Silvery, darker above, body posteriorly with numerous round, black spots ; dorsal and caudal fins similarly marked.

Locality.—Mossamedes (Pellegrin).

Distribution.—Tropical Atlantic, Gulf of Mexico, S.E. coast of United States.

Gen. Atractoscion Gill.

1862. Gill, Proc. Ac. Nat. Sci. Philad., p. 18.

1918. Ogilby, Mem. Queensl. Mus., vol. vi, p. 66.

Body elongate as in *Otolithus*. Cleft of mouth wide, oblique. Snout conical, with pores. No pores on chin. No barbels. Lower jaw projecting beyond upper. Maxilla not concealed under preorbital. Bands of villiform or cardiform teeth in jaws, with an enlarged series in upper and lower jaws, but no canines. Gill-rakers few, very short and stout, especially in adult. Pseudobranchiae present. Dorsal deeply notched. End of base of anal almost below last dorsal ray (further back than in *Sciaena* or *Otolithus*). Caudal emarginate. Lateral line tubes arborescent. Air-bladder present.

This genus was originally instituted for the Cape species. Ogilby has associated with it the Australian species *atelodus* Gnthr., which is here considered identical with *aequidens*.

Atractoscion aequidens (C. and V.).

Geelbek ; Cape Salmon ; Teraglin (Australia).

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 66.

1849. Smith, Illustr. Zool. S. Afr. Pisces, pl. xiii.

1867. Günther, Ann. Mag. Nat. Hist., (3), vol. xx, p. 60 (*atelodus*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 350 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 77 (references).

1918. Ogilby, *loc. cit.*, p. 67 (*atelodus*) (references).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 16.

Depth 4–4½, length of head 3⅕–3½, in length of body. Eye 5–7 in length of head, 1⅓–2 in snout, 1⅓–1½ in interorbital width. Maxilla reaching to below hind margin of eye. Preopercular margin with some widely spaced short spines, disappearing with age. Gill-rakers 8–9 on lower part of anterior arch (in adult so short as to be only knobs). D X . I 27–31, 1st spine short, 3rd or 3rd and 4th longest. A II 9, spines weak. Scales ctenoid (often feebly so) : l.l. 75–80 ; l.tr. $\frac{14\text{–}17}{25\text{–}29}$. Lateral line tubes (in adult) arborescent on anterior part of body, trifurcate on hinder part. Pyloric caeca 5.

Length.—Up to 1000 mm.

Colour.—Silvery, bluish above, belly white, edges of both jaws and

of opercle bright yellow, fins greyish, anal and ventrals white, a black axillary spot.

Locality.—Table Bay, False Bay and Agulhas Bank to Algoa Bay and Natal, down to 30 fathoms.

Distribution.—Coast of New South Wales.

I have examined a specimen of the Australian *atelodus* from the Australian Museum and can find no characters which will distinguish it from *aequidens*. Ogilby's description applies exactly to Cape specimens, except that the scales are said to be cycloid and rather more numerous below the lateral line. The former character is variable as the scales are never strongly ctenoid and often very feebly so ; as regards the latter difference Mr. Whitley informs me that none of the specimens he has examined have 33 scales below the lateral line, but 25–30.

The Geelbek or Cape Salmon is one of the commonest and most valued food-fishes in these waters. Both here and in Australia its flesh is esteemed superior to that of the Kabeljaauw (Jew-fish) in flavour.

Adults seem to appear inshore, in False Bay and other localities, during the summer months, but neither here nor in Australia is there any definite information as to the spawning season or the whereabouts of the spawning grounds.

Gen. Umbrina Cuv.

1817. Cuvier, Règne Anim., p. 297.

Body oblong-ovate. Snout prominent, with conspicuous pores. Similar pores on chin. A single rather thick-set barbel on chin. Lower jaw included. Bands of villiform teeth in jaws, the outer series in upper jaw enlarged ; no canines. Gill-rakers few, short, lower ones often rudimentary. Pseudobranchiae present. Dorsal deeply notched or divided into two ; 1st spine very short. Anal spines strong, 1st short. Caudal truncate, emarginate, or rounded. Lateral line tubes more or less branched. Air-bladder present.

Warm seas, sometimes entering rivers.

Key to the South African species.

I. Scales cycloid . . . . . *fuscolineata.*
II. Scales ctenoid.
  A. Dorsal rays 24–26.
    1. Numerous oblique dark stripes . . . . . *capensis.*
    2. Oblique pale streaks . . . . . *robinsoni.*

B. Dorsal rays 27–30.
  1. Height of spinous dorsal more than half length of head *sinuata.*
  2. Height of spinous dorsal less than half length of head.
    a. With dark more or less oblique stripes . . *striata.*
    b. Uniform . . . . . *macroptera.*

Umbrina fuscolineata von B.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 181 (*dussumieri* non C. and V.).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 351 (*dussumieri* non C. and V.) (not the references).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 15, pl. iv.

Depth about equal to length of head, $3\frac{1}{3}$–$3\frac{1}{2}$ in length of body. Eye $4\frac{3}{4}$–5 in length of head, $1\frac{1}{3}$ in snout, $1\frac{1}{2}$ in interorbital width. Maxilla reaching to below anterior third of eye. Depth of preorbital equal to eye-diameter. Barbel about $\frac{1}{4}$ diameter of eye. Gill-rakers 8–9 on lower part of anterior arch, the lower ones mere knobs. D X . I 26, 2nd spine or 2nd and 3rd longest, about $\frac{1}{2}$ depth of body. A II 7, 2nd spine moderately strong, equal to interorbital width, $\frac{3}{5}$ longest ray. Caudal rounded. Scales cycloid : l.l. 50–55 ; l.tr. $\frac{6}{14\text{–}16}$. Lateral line tubes bifurcate. Pyloric caeca 7–8.

Length.—Up to 210 mm.

Colour.—Brownish, silvery below, a dark band over nape to pectoral, top of head and of caudal peduncle dark, some dark horizontal stripes on sides below lateral line, opercle dark (bluish), a black axillary spot, pectoral bluish.

Locality.—Natal and Zululand coast, 20–30 fathoms.

Type in coll. Govt. Marine Survey.

The specimens described by Gilchrist and Thompson as *dussumieri* are undoubtedly the same as von Bonde's *fuscolineata* ; although considerably faded they still show traces of the dark stripe over the nape and shoulders. Gilchrist and Thompson noted certain differences from the typical *dussumieri*, but the chief difference lies in the lower spinous dorsal, which in *dussumieri* is much higher, being nearly or quite equal to the depth of the body.

It is to be noted that the dark band over the nape and shoulders is found also in *kuhli* C. and V., a species which is considered by Day as synonymous with *russelli*, a species with ctenoid scales.

Umbrina capensis Pappe.

Baardmann.

1853. Pappe, Synops. Ed. Fish. C.G.H., ed. 1, p. 16, and ed. 2, 1866, p. 11.

? 1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 274 (*cirrhosa* non Linn.).

1861. Castelnau, Mem. Poiss. l'Afr. Austr., p. 10.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 351.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 78.

? 1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 15.

Depth $2\frac{1}{2}$–3, length of head 3–$3\frac{1}{2}$, in length of body. Eye 4–$4\frac{3}{4}$ in length of head, $1\frac{1}{3}$ in snout, $1\frac{1}{4}$ in interorbital width. Maxilla reaching to below centre of eye. Depth of preorbital not quite equal to eye-diameter. Barbel about $\frac{1}{4}$ eye-diameter. Gill-rakers 8–9 on lower part of anterior arch; the lower ones mere knobs. D X . I 24–25, 3rd spine or 3rd and 4th longest, about $\frac{1}{2}$ length of head and $\frac{2}{5}$ depth of body. A II 7, 2nd spine stout, 3 in head, $3\frac{1}{2}$ in depth of body, and $\frac{1}{2}$–$\frac{2}{3}$ longest ray. Caudal subtruncate (adult). Scales ctenoid (including those on head and breast): l.l. 52–55; l.tr. $\frac{9\text{–}11}{16\text{–}18}$. Lateral line tubes with 3–5 branches. Pyloric caeca 8. (Plate XXIII, fig. 4.)

Length.—Up to 700 mm.

Colour.—Greyish above, whitish below, with silvery sheen, with 17–20 more or less distinct dark, oblique, somewhat wavy streaks narrower than the intervals; axil of pectoral dark, spinous dorsal and ventrals blackish, other fins greyish, soft dorsal with dark margin.

Locality.—False Bay and Agulhas Bank to Algoa Bay, down to 50 fathoms. Natal ?

Distinguished from *striata* by the more numerous and more oblique stripes, and fewer number of dorsal rays.

This species is very close to the European *cirrhosa*, a specimen of which was recorded from Algoa Bay by Günther. This identification seems to be erroneous. The true *cirrhosa* is distinguished from the Cape form by having 2–3 dorsal rays less, but chiefly by the greater height of the spinous dorsal, which is $\frac{3}{4}$ of the length of the head and of the depth of the body. The stripes appear to be much less distinct in *capensis* than in *cirrhosa*; neither Pappe nor Castelnau mention them, and they are not blue bordered with black in the living fish, as

described for *cirrhosa*. Moreover, *cirrhosa* is stated to have 65 scales in the lateral line.

Although recorded from Natal by von Bonde, I rather suspect that these specimens should be referred to the species here called *striata*.

U. canariensis Val. occurs on the west coast of Africa as far south as Angola (see Pellegrin, 1914, Ann. Inst. Ocean., vol. vi, p. 44). Steindachner considers this a variety of *cirrhosa* (Denk. Ak. Wiss. Wien, vol. lxv, p. 7, pl. ii, fig. 1, 1882).

Umbrina robinsoni G. and T.

Robinson's Tassel-fish.

1908. Gilchrist and Thomson, Ann. S. Afr. Mus., vol. vi, p. 182.

1911. *Id.*, *ibid.*, vol. xi, p. 38 (*angustilineata*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 351.

Depth 3–3½, length of head 3½, in length of body. Eye 4–5 in length of head, 1⅓–1½ in snout, 1¼–1⅓ in interorbital width. Maxilla reaching to below anterior third of eye. Depth of preorbital slightly less (young) or slightly greater (adult) than eye-diameter. Barbel about ¼ eye-diameter. Gill-rakers 9–10 on lower part of anterior arch, the lower ones mere knobs. D X . I 24–26, 3rd spine (or 3rd and 4th) longest, about ⅔ depth of body or length of head. A II 7, 2nd spine strong, about ⅖ length of head. Caudal subtruncate. Scales ctenoid (including head and breast): l.l. 49–52; l.tr. $\frac{8–9}{17–18}$. Lateral line tubes with 3–5 branches. Pyloric caeca 7.

Length.—Up to 350 mm.

Colour.—Brownish, probably with silvery sheen in life, with narrow wavy, oblique, light streaks, much narrower than the interspaces; opercle often with dark blotch, all the fins dark brown, especially the spinous dorsal, ventrals, and anal, which are blackish.

Locality.—Natal coast.

Types of *robinsoni* and *angustilineata* in South African Museum.

The type of *angustilineata* is a smaller specimen with the light streaks more distinct, but in no way differs from *robinsoni*.

Umbrina sinuata Day.

1878–88. Day, Fish. India, p. 182, pl. xlvi, fig. 1.

1889. *Id.*, Fauna Ind. Fishes, vol. ii, p. 109, fig. 48.

1908. Gilchrist and Thomson, Ann. S. Afr. Mus., vol. vi, p. 182.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 351.

Depth 3 or a little less, length of head 3 or a little more, in length of body. Eye $3\frac{1}{3}$ (young)–$5\frac{1}{2}$ in length of head, equal to interorbital width, and about equal to snout. Maxilla reaching to below anterior third of eye. Depth of preorbital $\frac{2}{3}$–$\frac{3}{4}$ eye-diameter. Barbel about $\frac{1}{4}$ eye-diameter. Gill-rakers 8–9 on lower part of anterior arch, the lower ones mere knobs. D X . I 27–29, 3rd spine or 3rd–4th longest, $\frac{2}{5}$–$\frac{3}{4}$ length of head, and depth of body. A II 7, 2nd spine strong, 2 in length of head, $2\frac{1}{2}$ in depth of body. Caudal rounded or wedge-shaped. Scales ctenoid : l.l. 44–50 ; l.tr. $\frac{7}{12}$. Lateral line tubes bifurcate, the hinder ones simple (at least in young).

Length.—Up to 420 mm.

Colour.—Greyish or brownish, with silvery sheen, with 9 wide sinuous, oblique, dark bands, the bands wider than interspaces ; opercle and axil blackish, spinous dorsal and ventrals black, soft dorsal and anal with black margins, caudal with dusky margin. According to Day the bands are more numerous in adult, being the outer edges of the wide bands of the young.

Locality.—Natal coast, 26 fathoms.

Distribution.—Indian seas, Persian Gulf.

The occurrence of this species in South African waters rests on the single small specimen described by Gilchrist and Thompson ; it is in very poor condition and shows no coloration except on the spinous dorsal and ventrals.

Umbrina striata Blgr.

Striped Tassel-fish.

1887. Boulenger, Proc. Zool. Soc., p. 660.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 181.

1911. *Id.*, *ibid.*, vol. xi, p. 58 (erratum).

1917. *Id.*, Ann. Durban. Mus, vol. i, pt. 4, p. 351.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 248 (*Sciaena s.*).

Depth $2\frac{2}{3}$–3, length of head 3–$3\frac{1}{5}$, in length of body. Eye $3\frac{3}{4}$–$4\frac{1}{2}$ in length of head, in young slightly greater than in adult ; $1\frac{1}{5}$–$1\frac{1}{3}$ in snout and interorbital width. Maxilla reaching to below anterior third of eye. Depth of preorbital $\frac{1}{2}$ (young)–$\frac{3}{4}$ eye-diameter. Barbel about $\frac{1}{4}$ eye-diameter. Gill-rakers 7–8 on lower part of anterior arch, the lower ones mere knobs. D X . I 27–28, 3rd and 4th spines longest, about $\frac{1}{2}$

length of head, and rather less than $\frac{1}{2}$ depth of body. A II 7, 2nd spine stout, $\frac{1}{2}$ length of head and $\frac{2}{5}$ depth of body, or sometimes a little shorter, $\frac{2}{3}$ longest ray. Caudal rounded in young, subtruncate in adult. Scales ctenoid (including those on breast and head): l.l. 49–51; l.tr. $\frac{7–8}{12–13}$. Lateral line tubes with 3–4 branches, the posterior tubes often simple in young. Pyloric caeca 7–8.

Length.—Up to 400 mm.

Colour.—Greyish, whitish below, with silvery sheen, with 9–12 more or less distinct wavy, sometimes anastomosing, dark streaks, oblique on back, more or less horizontal on sides, narrower than the intervals; opercle and axil of pectoral more or less blackish, spinous dorsal and ventrals dark, other fins (as preserved) greyish; soft dorsal with dark margin.

Locality.—East London and Natal coast.

Distribution.—Persian Gulf.

I very much doubt whether the Natal fish will prove to be the same as that from the Persian Gulf, as the proportions are considerably different, though it should be noted that *striata* was described from a single dry specimen.

This species is distinguished from *capensis* by having the stripes, especially the lower ones, more or less horizontal: thus the stripe which begins near the axil of the pectoral runs to the upper surface of the caudal peduncle or to the *hinder* rays of the soft dorsal, whereas in *capensis* the corresponding stripe runs to the *middle* of the soft dorsal.

Umbrina macroptera (Blkr.).

1853. Bleeker, Nat. Tyds. Ned. Ind., vol. iv, p. 254.
1874. *Id.*, Verh. Ak. Amsterd., vol. xiv, p. 60.
1878–88. Day, Fish. India, p. 182.
1917. Jordan and Starks, Ann. Carn. Mus., vol. xi, p. 454.
1925. Fowler, J. Bomb. Nat. Hist. Soc., vol. xxx, p. 320.

Depth $3\frac{1}{4}$–$3\frac{1}{3}$, length of head $3\frac{2}{5}$–$3\frac{1}{2}$, in length of body. Eye $4\frac{1}{2}$ in length of head, slightly less than snout, and nearly $1\frac{1}{2}$ in interorbital width. Maxilla reaching to below centre of eye. Depth of preorbital $\frac{3}{4}$ eye-diameter. Barbel very short, less than $\frac{1}{4}$ eye-diameter, sometimes almost obsolete. Gill-rakers 10 on lower part of anterior arch, the lower ones rudimentary. D X . I 28–30, 2nd spine or 2nd–4th longest, $2\frac{1}{2}$ in depth of body. A II 7, 2nd spine stout, not quite $\frac{1}{2}$ depth of body, $\frac{2}{3}$ longest ray. Caudal rounded, wedge-shaped. Scales ctenoid

(except on head and breast) : l.l. 46–50 ; l.tr. $\frac{4\text{–}6}{12\text{–}14}$. Lateral line tubes with 3–4 branches. Pyloric caeca 8 (Day, 11).

Length.—Up to 230 mm.

Colour.—Greyish, silvery below, the sides with numerous minute dots, axil of pectoral and a blotch on opercle blackish, spinous dorsal blackish, other fins greyish or yellowish, dotted.

Locality.—Natal coast.

Distribution.—Indian seas, Malay Archipelago.

Fowler's scale-count of 8 scales below lateral line is evidently taken further back than Day's or my own.

Fam. 25. Mullidae.

Surmullets ; Red mullets.

Body oblong-elongate, with large cycloid or slightly ctenoid scales. Mouth small, subterminal, protractile. Maxilla partly concealed by preorbital, without supplemental bone. Subocular shelf strong. Teeth villiform in the jaws and often on vomer and palatines. Nostrils paired, far apart. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Branchiostegals 4. Two long unbranched barbels on the chin. Two dorsal fins, both short. Anal short, with 1–2 spines. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal forked. Air-bladder usually present, simple. Pyloric caeca few or moderately numerous. Lateral line single, the tubes often branched.

Tropical and subtropical seas, extending into temperate waters ; sometimes entering estuaries. Eggs pelagic. The Surmullets are noted for their brilliant colours. Though not reaching a large size, they are valued as food-fishes of excellent flavour.

Key to the South African genera.

1. Vomer and palatines with teeth . . . . . *Upeneus.*
2. Vomer and palatines without teeth.
   - *a.* Teeth in jaws in bands or several series . . . . *Mulloides.*
   - *b.* Teeth in jaws in a single series . . . . . *Parupeneus.*

Gen. Upeneus Cuv.

1829. Cuvier, Règne Anim., ed. 2, p. 157 (part).

1849. Bleeker, Verh. Batav. Gen., vol. xxii, p. 63 (*Upeneoides*)

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 397 (*Upeneoides*).

1868. Bleeker, Versl. Ak. Amsterd., vol. ii, p. 345.

1907. Snyder, Proc. U.S. Nat. Mus., vol. xxxii, p. 97, and footnote by Jordan, p. 88.

Vomer and palatines with teeth. Teeth in the jaws in villiform bands. Snout comparatively short, maxilla reaching to below anterior margin of eye. Interorbital nearly flat, the eye touching or nearly touching the dorsal profile.

Indo-Pacific Ocean.

Key to the South African species.

1. Caudal with oblique dark bars.
   a. A black lateral stripe. First dorsal fin scarcely higher than 2nd *tragula.*
   b. No dark lateral stripe. First dorsal fin distinctly higher than 2nd *vittatus.*
2. Caudal without oblique dark bars . . . . . *bensasi.*

**Upeneus tragula* Rich.

1846. Richardson, Ichthyol. China, p. 220.

1877. Bleeker, Atl. Ichthyol., vol. ix, pl. cccxcii, fig. 2.

1878–88. Day, Fish. India, p. 121, pl. xxx, fig. 4.

1907. Snyder, *loc. cit.*, p. 100 (references).

1919. Regan, Ann. Durban Mus., vol. ii, p. 200.

Depth 4, length of head $3\frac{1}{2}$–$3\frac{3}{4}$, in length of body. Eye 4 in length of head, equal to interorbital width, $1\frac{1}{2}$ in snout. Maxilla reaching to below anterior margin or anterior third of eye. Barbels scarcely reaching angle of preopercle. Gill-rakers 12 plus 4–5 rudimentary ones on lower part of anterior arch. D VIII+I 8, 1st spine minute or obsolete, 2nd longest, $\frac{2}{3}$–$\frac{3}{4}$ depth of body, 1st dorsal scarcely higher than 2nd. A I 7, spine feeble. Scales ctenoid, some on snout and preorbital: l.l. 30–32; l.tr. $\frac{2}{5\text{–}7}$. Lateral line tubes arborescent. Pyloric caeca 6.

Length.—Up to 230 mm.

Colour.—Silvery or golden, reddish above, with dark dots and a dark or blackish lateral stripe from snout through eye to caudal, 1st dorsal with broad black margin, caudal with oblique dark bars, pectorals, ventrals, and anal with reddish or dark bands.

Locality.—Natal coast.

Distribution.—Indo-Pacific to Japan and Australia.

Upeneus vittatus (Forsk.).

Bar-tailed Surmullet.

1775. Forskal, Desc. Anim., p. 31.

1877. Bleeker, Atl. Ichthyol., vol. ix, pl. cccxcii, fig. 3.

1878–88. Day, Fish. India, p. 120, pl. xxx, fig. 2.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 219, pl. xxvii, fig. 2.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 365 (references).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 23.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 246.

Depth $3\frac{2}{3}$–$3\frac{3}{4}$, length of head $3\frac{1}{2}$–$3\frac{3}{5}$, in length of body. Eye $3\frac{1}{2}$–$3\frac{3}{4}$ in length of head, equal to interorbital width, $1\frac{1}{4}$–$1\frac{1}{3}$ in snout. Maxilla reaching to below anterior third of eye. Barbels not reaching to angle of preopercle. Gill-rakers 11–12 plus some rudiments on lower part of anterior arch. D VIII+I 8, 1st spine minute, 2nd and 3rd longest, $\frac{3}{4}$ depth of body, 1st dorsal distinctly higher than 2nd. A I 7, spine feeble. Scales ctenoid, some on snout and preorbital: l.l. 37–39; l.tr. $\frac{2}{7}$. Lateral line tubes arborescent. Pyloric caeca 11. (Plate XXIV, fig. 1.)

Length.—Up to 250 mm.

Colour.—Golden, reddish above, with 2–4 yellow, orange, or reddish lateral stripes, 1st dorsal with black margin and 1–2 dusky bands, caudal with oblique black bars.

Locality.—Natal coast, Delagoa Bay, to 40 fathoms.

Distribution.—Indo-Pacific.

Upeneus bensasi (T. and S.).

1845. Temminck and Schlegel, Fauna Jap. Poiss., p. 30, pl. xi, fig. 2.

1878–88. Day, Fish. India, p. 121, pl. xxx, fig. 5.

1907. Snyder, Proc. U.S. Nat. Mus., vol. xxxii, p. 97, fig. 3.

Depth $3\frac{2}{3}$–4, length of head $3\frac{1}{4}$–$3\frac{1}{3}$, in length of body. Eye 4–$4\frac{1}{2}$ in length of head, $1\frac{1}{3}$ to nearly 2 in snout, $1\frac{1}{4}$–$1\frac{1}{2}$ in interorbital width. Maxilla reaching to below anterior margin of eye, or a little beyond. Barbels reaching to angle of preopercle, or a little beyond. Gill-rakers 13–14 plus a few rudiments on lower part of anterior arch. D VII +I 8 (true 1st spine obsolete), apparent 1st or 1st and 2nd spines longest, $\frac{2}{3}$ depth of body, 1st dorsal a little higher than 2nd. A I 6, spine feeble. Scales ctenoid, some on snout and preorbital: l.l. 32–24;

l.tr. $\frac{2}{7}$. Lateral line tubes arborescent. Pyloric caeca 15 (Snyder).

Length.—Up to 170 mm.

Colour.—Rosy, darker above, lighter below, with faint yellow lines or reddish spots, spinous dorsal dusky, soft dorsal and caudal with reddish bars, those on caudal oblique, pectorals, ventrals, and anal yellowish.

Locality.—Delagoa Bay.

Distribution.—Indo-Pacific to Japan.

Gen. Mulloides Blkr.

1848. Bleeker, Verh. Bat. Gen., vol. xxii.

1852. *Id.*, Nat. Tijds. Ned. Ind., vol. iii, p. 697.

Vomer and palatines without teeth. Teeth in jaws in several rows or narrow bands. Snout comparatively long, maxilla not nearly reaching to below anterior margin of eye.

Indo-Pacific Ocean.

Mulloides auriflamma (Forsk.).

Yellow-stripe Surmullet.

1775. Forskal, Descr. Anim., p. 30.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 406 (*flavolineatus*).

1870. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xx, p. 742.

1877. Bleeker, Atl. Ichthyol., vol. ix, pl. cccxciv, fig. 3 (*flavolineatus*).

1878–88. Day, Fish. India, p. 122, pl. xxx, fig. 6 (*flavolineatus*).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 231 (*flavolineatus*).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 163 (*Upeneus queketti*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 364 (references) and p. 365 (*U. queketti*).

Depth 4–4½, length of head 3⅓–3⅔, in length of body. Eye 3¾–4 in length of head, equal to or slightly less than interorbital width, 1⅔–2 in snout. Maxilla reaching to below a point about midway (or a little more) from tip of snout to anterior margin of eye. Barbels reaching to angle of preopercle. Gill-rakers 14–15 and some rudiments on lower part of anterior arch. D VII+I 8, the true 1st spine quite obsolete, anterior (2nd) spine longest, 1¼–1⅓ in depth of body. A I 6,

spine feeble. Scales ctenoid, none on preorbital : l.l. 36–38 ; l.tr. $\frac{2}{6-7}$.

Lateral line tubes arborescent. Pyloric caeca 17-18.

Length.—Up to 325 mm.

Colour.—Pale golden or silvery, deeper orange or reddish above, a deep yellow lateral stripe from eye to caudal, fins pinkish ; head and body often (? breeding season) with reddish spots of varying size.

Locality.—Natal coast, Delagoa Bay.

Distribution.—Indo-Pacific.

Types of *Upeneus queketti* in South African Museum.

Klunzinger (*loc. cit.*) states that in the Red Sea these fishes spawn during the months of June to August, when they arrive inshore and in the harbours in large shoals.

Gen. Parupeneus Blkr.

1829. Cuvier, Règne Anim., ed. 2, vol. ii, p. 157 (*Upeneus* part).

1863. Bleeker (quoted from Jordan, Classification ; the Ind. Zool. gives 1887, Klunzinger).

1913. Weber, Siboga Exp. Monogr., 57, p. 294.

Vomer and palatines without teeth. Teeth in jaws in a single series, rather strong and unequal. Snout moderately long, maxilla not reaching to below anterior margin of eye.

Indo-Pacific Ocean.

Key to the South African species.

1. Lateral line tubes with very short branches. No dark markings . *cyclostomus.*
2. Lateral line tubes arborescent.
   - *a.* A dark lateral stripe and a spot on caudal peduncle.
     - i. Last dorsal and anal ray prolonged. Gill-rakers 24 . *macronema.*
     - ii. Last dorsal and anal ray not prolonged. Gill-rakers 16–17 *barberinus.*
   - *b.* No dark lateral stripe.
     - i. A dark saddle over caudal peduncle . . . . *fraterculus.*
     - ii. A dark spot on caudal peduncle . . . . . *indicus.*
     - iii. A dark spot below gap between dorsal fins . . *pleurostigma.*

**Parupeneus cyclostomus* (Lacép.).

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 404, pl. xix, fig. 3.

1873–75. Günther, Fische d. Südsee, vol. i, p. 60, pl. xlv, fig. A (*chryserythrus* non Lacép.).

1878–88. Day, Fish. India, p. 125, pl. xxxi, fig. 2 (*luteus*).

1877. Bleeker, Atl. Ichthyol., vol. ix, pl. cccxciii, fig. 2 (*chrysedrus* non Lacép.).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 226. pl. xxvi, fig. 4 (synonymy).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321.

Depth $3\frac{1}{4}$–$3\frac{1}{2}$, length of head $2\frac{4}{5}$–$3\frac{1}{5}$, in length of body. Eye 5–6 in length of head, $2\frac{1}{2}$–$3\frac{1}{2}$ in snout. Barbels reaching to, or nearly to, base of ventrals. D VIII+I 8, 1st spine short, 2nd or 2nd and 3rd longest, about $\frac{2}{3}$–$\frac{3}{4}$ depth of body. A I 6, spine feeble. Scales ctenoid : l.l. 30 ; l.tr. $\frac{2}{7}$. Lateral line tubes with very short lateral tubules.

Length.—Up to 340 mm.

Colour.—Reddish or orange-yellow, paler below, head with bluish stripes from snout to opercle, fins yellowish, soft dorsal and anal with 3–5 bluish bands.

Locality.—Natal coast.

Distribution.—Indo-Pacific.

Parupeneus macronema (Lacép.).

1802. Lacépède, Hist. Nat. Poiss., vol. iii, pp. 383, 404, pl. xiii, fig. 2.

1877. Bleeker, Atl. Ichthyol., vol. ix, pl. cccxci, fig. 3.

1878–88. Day, Fish. India, p. 123, pl. xxxi, fig. 1.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 224.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 245 (*dispilurus* non Playf.).

Depth $3\frac{1}{5}$–$3\frac{1}{3}$, length of head 3, in length of body. Eye $4\frac{1}{2}$–5 in length of head, 2–$2\frac{1}{2}$ in snout. Barbels reaching to angle of preopercle or beyond. Gill-rakers 24 on lower part of anterior arch. D VII–VIII+I 8, 1st spine minute or obsolete, 2nd rather strong, 3rd and 4th longest, $\frac{2}{3}$ depth of body ; soft dorsal lower than spinous, last ray the longest, often reaching nearly to caudal fin. A I 6, spine feeble, last ray prolonged similarly to that of soft dorsal. Scales ctenoid : l.l. 29–30 ; l.tr. $\frac{2}{7}$. Lateral line tubes arborescent.

Length.—Up to 295 mm.

Colour.—Rosy or salmon, a dark brown band from snout through eye to below end of soft dorsal, and a brown spot in middle (*i.e.* on the 24th–25th scales of the lateral line) of caudal peduncle, fins pinkish

or yellowish, soft dorsal, anal and ventrals banded, a deep violet band along base of soft dorsal, caudal with dark edging.

Locality.—Delagoa Bay.

Distribution.—Indian seas, East Indies.

Parupeneus barberinus (Lacép.).

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 406, pl. xiii, fig. 3.

1873–75. Günther, Fische d. Südsee, vol. i, p. 57, pl. xlii.

1877. Bleeker, Atl. Ichthyol., vol. ix, pl. cccxciii, fig. 1.

1878–88. Day, Fish. India, p. 124.

1907. Snyder, Proc. U.S. Nat. Mus., vol. xxxii, p. 92.

Depth $3\frac{1}{5}$–$3\frac{2}{5}$, length of head 3, in length of body. Eye $4\frac{1}{2}$–$5\frac{1}{2}$ in length of head, 2–$2\frac{1}{2}$ in snout. Barbels reaching to angle of preopercle. Gill-rakers 16–17 on lower part of anterior arch. D VIII+I 8, 1st spine minute, 3rd longest, $\frac{2}{3}$ depth of body; spinous dorsal a little higher than soft, the anterior rays of which are higher than the posterior ones. A I 6, spine feeble, last ray not prolonged. Scales ctenoid: l.l. 29–31; l.tr. $\frac{2}{7}$. Lateral line tubes arborescent. Pyloric caeca 17–18.

Length.—Up to 500 mm.

Colour.—Pink or salmon or reddish, bluish and yellowish streaks more or less distinct, or simply a brown band from eye to tip of snout, a dark brown stripe from eye to below end of soft dorsal and a brown spot at end (*i.e.* on 27th and 28th scales of the lateral line) of caudal peduncle, fins pinkish, soft dorsal and anal more or less distinctly banded.

Locality.—Delagoa Bay.

Distribution.—Indo-Pacific to Japan.

Parupeneus fraterculus (C. and V.).

East African Surmullet.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vii, p. 524.

1866. Playfair in Playfair and Günther, Fish. Zanz., p. 41, pl. v, fig. 4 (*dispilurus*), and p. 41, pl. v, fig. 3 (*pleurotaenia*).

1878–88. Day, Fish. India, p. 125, pl. xxxi, fig. 3 (*dispilurus*).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii (1903), p. 261, fig. 109.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 164 (*indicus* non Shaw).

1909. *Id.*, *ibid.*, vol. vi, p. 229 (*natalensis*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 364 (*natalensis*).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321 (*spilurus* non Blkr.).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 246.

Depth 3–3½, length of head 3–3¼, in length of body. Eye 4¼–5 in length of head, 1¾–2½ in snout. Barbels reaching a little beyond angle of preopercle. Gill-rakers 17–18 on lower part of anterior arch. D VIII+I 8, 1st spine short, 3rd and 4th longest, about ⅔ depth of body. A I 6, spine feeble. Scales ctenoid : l.l. 29–31 ; l.tr. $\frac{2}{6\text{–}7}$. Lateral line tubes arborescent, especially the anterior ones. Pyloric caeca 22.

Length.—Up to 350 mm.

Colour.—Reddish or carmine, a large golden blotch on side of back between the end of soft dorsal and a blackish saddle-like band over the upper part of caudal peduncle, scales on upper parts often with orange spots, often purplish band on snout to eye, dorsal purplish or dusky ; soft dorsal, anal, and caudal more or less distinctly banded or mottled.

Locality.—Natal coast, Delagoa Bay, Chinde.

Distribution.—East coast of Africa to Red Sea.

Type of *natalensis* in South African Museum.

In the localities above given this species is the commonest species of the family in South African waters. The specimens examined are clearly identical with Playfair's specimens from further up the East African coast, and for these reasons it seems to me that Norman's specimen should also be identified as *dispilurus* rather than as the Japanese *spilurus*.

Parupeneus indicus (Shaw).

1803. Shaw, Gen. Zool., vol. iv, pt. 2, p. 614.

1877. Bleeker, Atl. Ichthyol., vol. ix, pl. cccxciv, fig. 5.

1878–88. Day, Fish. India, p. 126, pl. xxxi, fig. 4.

1907. Snyder, Proc. U.S. Nat. Mus., vol. xxxii, p. 93 (references and synonymy).

1913. Weber, Siboga Exp. Monogr., 57, p. 296.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 364 (references, except Gilchrist and Thompson, 1908).

Depth 3½–3⅘, length of head 3⅕–3¼, in length of body. Eye 4½ in length of head, 2 in snout. Barbels reaching to angle of preopercle. Gill-rakers 17 on lower part of anterior arch. D VIII+I 8, 1st spine

minute, 3rd longest, $\frac{3}{5}$–$\frac{2}{3}$ depth of body; soft dorsal a little lower than spinous, its last ray not prolonged. A I 6, spine feeble, last ray not prolonged. Scales ctenoid: l.l. 30; l.tr. $\frac{2}{7}$. Lateral line tubes arborescent.

Length.—Up to 400 mm.

Colour.—Reddish or olivaceous, an oval golden-yellow blotch on lateral line below interspace between the dorsals (fading after death), and a brown spot near end (*i.e.* on about the 26th and 27th scales of lateral line) of caudal peduncle, a dark band (violet with yellow margins) from eye to tip of snout, spinous dorsal dusky or purplish, soft dorsal and anal faintly barred.

Locality.—Delagoa Bay.

Distribution.—Indo-Pacific to Japan.

**Parupeneus pleurostigma* (Benn.).

1831. Bennett, Proc. Zool. Soc. Lond., vol. i, p. 59.

1873–75. Günther, Fische d. Südsee, vol. i, p. 58.

1877. Bleeker, Atl. Ichth., vol. ix, pl. cccxciii, fig. 3.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 229.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 260, fig. 108.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii.

Depth $3\frac{1}{5}$–$3\frac{1}{2}$, length of head $3\frac{1}{8}$, in length of body. Eye 4–5 in length of head, $1\frac{3}{4}$ in snout. Barbels reaching to or a little beyond hind margin of preopercle. Gill-rakers 18 on lower part of anterior arch. D VIII+I 8, 1st spine minute or obsolete, 2nd spine $1\frac{4}{5}$ in length of head; soft dorsal lower than spinous. A I 6, spine feeble. Scales ctenoid: l.l. 29–31; l.tr. $\frac{2}{6}$. Lateral line tubes arborescent.

Length.—Up to 225 mm.

Colour.—Red, paler below, a round or oval black spot on lateral line below the space between the 2 dorsal fins, with a more or less distinct silvery spot behind it; 1st dorsal with dark margin, a dark band along base and some violet bars on 2nd dorsal, anal banded, pectorals, ventrals, and caudal yellowish or rosy.

Locality.—Delagoa Bay.

Distribution.—Mauritius, Zanzibar, East Indies, S. Pacific.

Fam. 26. Emmelichthyidae.

1924. Chabanaud, Bull. Soc. Zool. Tr., vol. xlix, p. 248 (*Dipterygonotidae*).

Body oblong or elongate, with moderate or rather small ctenoid scales. Mouth oblique, strongly protractile. Maxilla broad, scaly, with supramaxilla slipping under preorbital. Teeth absent, or minute and deciduous. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Spinous and soft portions of dorsal fin connected, shallowly or deeply notched ; or separate, with 1–4(5) disconnected spines between them. Anal short, with 3 spines. Base of soft dorsal and anal scaly posteriorly. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal forked. Lateral line single. Air-bladder present. Pyloric caeca few.

A small family of moderately deep-water fishes previously known from Australasia, Chile, East Indies, Hawaii, and Japan, and now recorded from South Africa. They all have a compact and neat aspect (whence Richardson's name for the type genus), and in a living state are brightly coloured.

The true generic position of *Boxaodon cyanescens* Guich. (Chile) and *Dipterygonotus leucogrammicus* Blkr. (East Indies) seems a little doubtful. *Erythrocles scintillans* Jord. and Thomps. (Hawaii) may require a new generic name, as it differs from *E. schlegeli* Blkr. (Japan) in having the two dorsals narrowly united, without any disconnected spines.

The family name *Dipterygonotidae*, adopted by Chabanaud, is inadmissible, as *Emmelichthys* is the earliest genus.

Key to the South African genera.

1. Disconnected spines between spinous and soft dorsal fins . *Emmelichthys.*
2. Spinous and soft portions continuous . . . . . *Plagiogeneion.*

Gen. Emmelichthys Rich.

1845. Richardson, Voy. Erebus and Terror, p. 47.

1848. Guichenot in Gay. Hist. Chile Zool., vol. ii, p. 208 (*Boxaodon*).

Body elongate, slightly compressed. Dorsal spines 14, the last connected with soft dorsal, the preceding 4 disconnected. Last dorsal and anal ray produced, longer than preceding ones. Preopercle broadly rounded, hind (vertical) margin sloping downwards and backwards, not concave. Preorbital strongly projecting, rounded anteriorly.

No lateral ridge on caudal peduncle. Teeth completely obsolete. A long scaly process between bases of ventrals.

Emmelichthys nitidus (Rich.).

1845. Richardson, *loc cit.*, p. 47, pl. xxix, figs. 7, 8.
1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 395.
1907. Stead, Add. Fish-fauna N.S.W., No. 1, p. 16.
1911. McCulloch, Zool. Res. " Endeavour," vol. i, p. 66.

Depth 4 or a little more, length of head $3\frac{1}{2}$, in length of body. Eye 4 in length of head, equal to snout, and equal to or slightly less than interorbital width. Maxilla rounded behind, reaching to, or nearly to, below centre of eye. Hind margin of preopercle and opercle minutely denticulate. Gill-rakers 27 on lower part of anterior arch. D IX+IV+I 9–10; 1st spine $\frac{1}{3}$–$\frac{2}{5}$ length of 2nd, which is nearly as long as 3rd and 4th, the latter slightly the longest, disconnected spines short, last about $\frac{1}{2}$ length of the spine adjoining the soft rays. A III 10. Scales: l.l. 96–100; l.tr. $\frac{8–9}{20–23}$. Top of snout scaleless. (Plate XXIV, fig. 2.)

Length.—Up to 470 mm.

Colour (as preserved).—Golden, with silvery sheen, pale longitudinal streaks from head to tail showing through the scales.

Locality.—Simonstown, False Bay, 1891. There is a second specimen in the South African Museum collection without exact locality.

Distribution.—W. and S.E. Australia, New Zealand.

The two South African specimens, 470 and 350 mm. in length, accord fully with Richardson's description and figure, though he does not state the actual number of gill-rakers.

Gen. Plagiogeneion Forbes.

1890. Forbes, Tr. N.Z. Inst., vol. xxii, p. 273.
1914. McCulloch, Zool. Res. " Endeavour," vol. ii, pt. 3, p. 103.

Body oblong, moderately compressed. Dorsal fin continuous, spines 12, the penultimate as long as the ultimate one. Last dorsal and anal ray not produced. Preopercle broadly rounded, vertical margin gently concave. Preorbital projecting, somewhat angular anteriorly. No lateral ridge on caudal peduncle. A single row of minute teeth in each jaw, more or less obsolete; sometimes a few on vomer. A short scaly process between bases of ventrals.

Plagiogeneion rubiginosus (Hutton).

1876. Hutton, Tr. N.Z. Inst., vol. viii, p. 209.
1890. Forbes, *ibid.*, vol. xxii, p. 273.
1913. Waite, *ibid.*, vol. xlv., p. 218, pl. vii.
1913. *Id.*, Rec. Canterb. Mus., vol. ii, pt. 1, p. 18.
1914. McCulloch, Zool. Res. "Endeavour," vol. ii, pt. 3, p. 104.

Depth 3, length of head a little over 3, in length of body. Eye 3 in length of head, $1\frac{1}{2}$ times snout, a little greater than interorbital width. Maxilla angularly truncate behind, reaching to below anterior third of eye. Hind margin of preopercle minutely denticulate, of opercle smooth, entire. Lower margin of preorbital serrate. Gill-rakers 27 on lower part of anterior arch. D XII 10, spines graduated to 4th, which is longest. A III 9. Scales: l.l. 68–71 (plus a few on base of tail); l.tr. $\frac{12}{24}$. Snout completely scaly.

Length.—Up to 365 mm.

Colour.—Uniform silvery with delicate salmon-pink tinge on body and fins, iris silvery, pupil black.

Locality.—Off Cape Peninsula (33° 17′ S., 17° 26′ E.), 180 fathoms.

Distribution.—New Zealand, S.E. Australia.

The single South African specimen, 280 mm. long, obtained by a trawler in 1925, agrees with McCulloch's Australian specimen in having the base of soft dorsal distinctly less than half length of spinous dorsal, and the ventral spine arising below the 2nd–3rd dorsal spines. The caudal is scaly only at the base.

Neither Waite's description of *rubiginosus* nor McCulloch's description of *macrolepis* mention serrations on the preorbital, though there is a suggestion of such in Waite's figure.

Fam. 27. Bramidae.

Body oblong, more or less elevated, strongly compressed, with large or small, adherent, cycloid scales. Scales normal or more or less lobate; in the young with a median ridge or spine, which disappears in adult, but may persist in some half-grown examples. Mouth moderate, very oblique, protractile. Maxilla broad. Teeth cardiform, in bands in jaws, and sometimes on vomer and palatines. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. A single dorsal fin, long, often elevated in front, anterior 3–4 spines simple, short, the remaining ones

articulated, and branched. Anal similar to dorsal. Both dorsal and anal scaly, but without definite basal sheath. Ventrals thoracic, of a spine and 5 rays, with axillary process. Pectoral moderate or rather long. Caudal forked. Air-bladder present or absent. Pyloric caeca few. Lateral line present or obsolete.

A family of pelagic fishes, often descending to considerable depths, and widely distributed. Noticeable changes occur during growth, the young having spinose scales, while in the adult the spines are frequently lost.

Key to the South African genera.

1. Scales small. Dorsal and anal not falcate . . . . . *Brama.*
2. Scales large. Dorsal and anal falcate . . . . . *Taractes.*

Gen. Brama Bl. Schn.

1801. Bloch Schneider, Syst. Ichth., p. 98.

1810. Rafinesque, Caratteri, p. 53 (*Lepodus*).

Palatine and vomerine teeth present, but often obscure or lost with age ; the outer series of teeth in the jaws more or less enlarged. Scales small, without spines in adult. Dorsal and anal moderately elevated anteriorly. Lateral line obsolete, or sometimes visible posteriorly. Air-bladder large. Preorbital at least half diameter of eye.

Brama raii (Bl.).

Sea-bream ; Bull-eye.

1801. Bloch Schneider, Syst. Ichth., p. 99.

1892. Smitt, Skand. Fish., vol. i, p. 77, pl. vi, fig. 1, text-fig. 23.

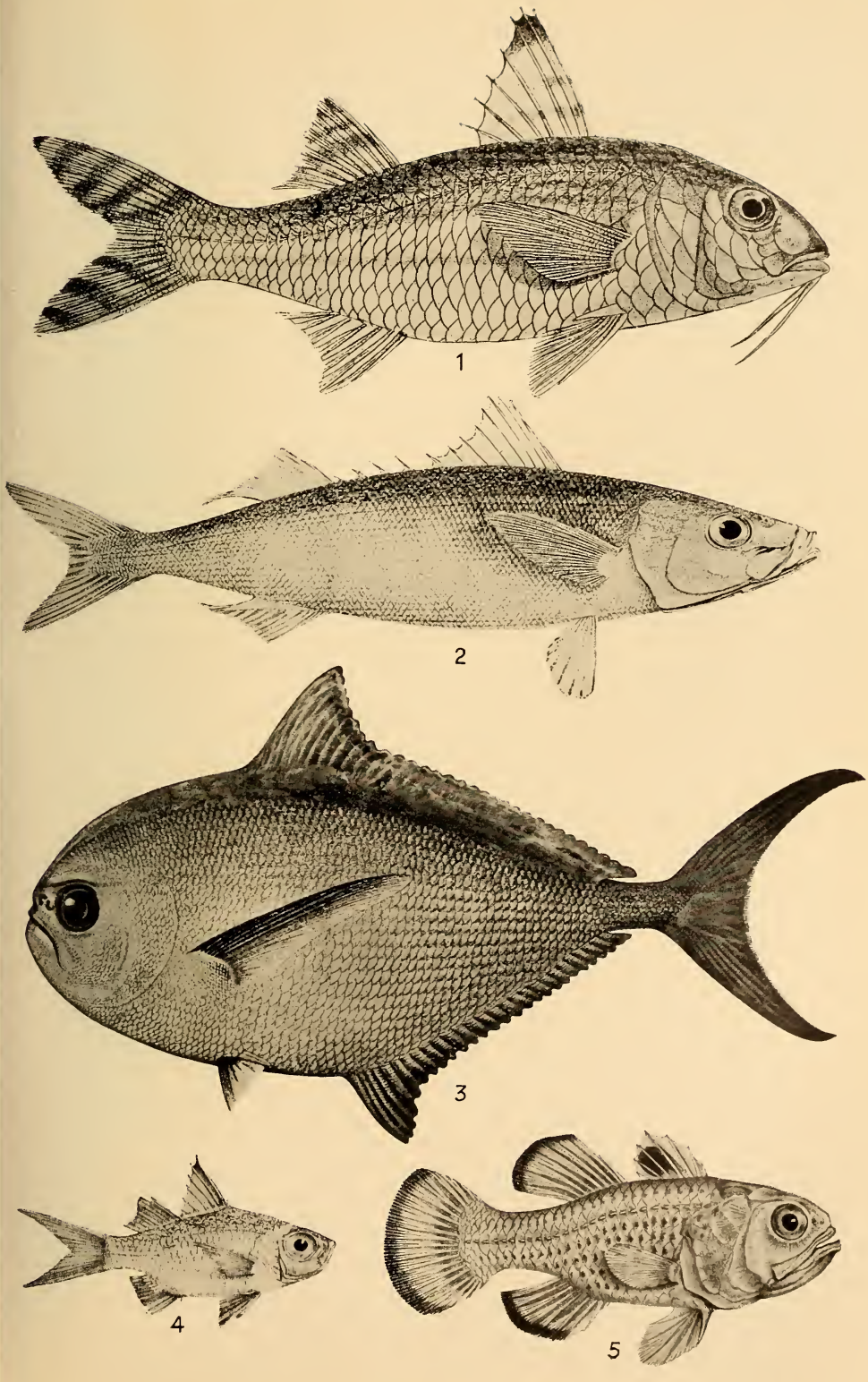
1918. Thompson, Mar. Biol. Rep., vol. iv, p. 122 (references).

1918. Schmidt, Dan. Ocean. Exp., vol. ii, A 6 (post-larval stages).

Depth 2 (or a little over), length of head $3\frac{1}{2}$–4, in length of body. Eye equal to snout, and to interorbital width, $3\frac{3}{4}$–$3\frac{4}{5}$ in length of head. Maxilla reaching to below centre of eye. Vomerine and palatine teeth often obscure or lost in adult. Gill-rakers 12 on lower part of anterior arch, their inner margins spinulose. D III 30–33, longest anterior rays a little over $\frac{1}{2}$ length of head. A II 26–27, longest anterior rays a little over $\frac{1}{3}$ length of head. Pectoral about $\frac{3}{4}$ depth of body. Caudal deeply forked. Scales : lat. ser. 80–95, without spines in adult. Whole head, except snout, inter-, supra-, and pre-orbital, and lower jaw, scaly. Pyloric caeca 4. (Plate XXIV, fig. 3.)

PLATE XXIV.

FIG.		TEXT-PAGE
1.	*Upeneus vittatus* (Forsk.) (after Day)	584
2.	*Emmelichthys nitidus* (Rich.) (after Richardson)	592
3.	*Brama raii* (Bl.) (after Smitt)	594
4.	*Ambassis urotaenia* Blkr. (after Day)	642
5.	*Apogon queketti* Gilch. (after Gilchrist)	517



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Length.—Up to 700 mm.

Colour.—Brownish, darker along back, with silvery sheen, especially on belly and the scales covering the fins; vertical fins blackish, pectoral and ventral yellowish, iris black-brown, pupil light.

Locality.—Table Bay, Agulhas Bank.

Distribution.—Mediterranean and Atlantic Ocean, Japan, New Zealand, down to 500 fathoms.

The young has a deeper body, the ventral profile being much more convex than the dorsal, the scales bear a central hooked spine, and the preopercular angle is spinose.

An excellent food-fish.

Gen. Taractes Lowe.

1843. Lowe, Proc. Zool. Soc. Lond., p. 82.

Palatine and vomerine teeth present. Scales rather large, without hooked spines in adult. Dorsal and anal fins strongly falcate in adult. Lateral line obsolete. Preorbital less than half diameter of eye. A transverse groove above and below on caudal peduncle at base of caudal.

Taractes longipinnis (Lowe).

Long-finned Sea-bream.

1843. Lowe, *loc. cit.*, p. 82 (half-grown).

1843. *Id.*, *ibid.*, p. 83 (*asper*=young).

1863. Johnson, *ibid.*, p. 36 (*princeps*, adult).

Not Smitt, Skand. Fish., vol. i, p. 80, fig. 24 (=*raschii* Esmark).

Depth $1\frac{2}{3}$ to nearly 2, length of head $3\frac{1}{4}$–$3\frac{1}{3}$, in length of body. Eye $3\frac{2}{3}$–4 in length of head, slightly greater than snout. Maxilla reaching to below centre of eye. D III 31–32. A II–III 25–26. Both strongly falcate, the 1st ray equal to length of body in half-grown, half length of body in adult, the succeeding rays rapidly decreasing. Scales: lat. ser. 41–45, those on body in young and half-grown with recurved spines, those on caudal peduncle with antrorse spines, the change of direction occurring under the last dorsal rays, 2 series of spinose scales on each side of caudal peduncle. In adult no spines on scales. Whole head, except snout, inter-, supra-, and pre-orbital, and lower jaw, scaly. Pyloric caeca 5 (Johnson).

Length.—Up to 825 mm.

Colour.—Blackish-grey, iridescent coppery, iris dark brown, pupil pale grey (Johnson).

Locality.—Simonstown, False Bay, 1876.

Distribution.—Madeira.

The South African specimen is half-grown, 350 mm. long, and consists of a dried half-skin, otherwise in excellent condition. The scales are spinose and the longest dorsal and anal fins rays equal to length of body. The transverse grooves on caudal peduncle are present as in *princeps*, and the broad flat keel on either side mentioned by Johnson is indicated by the two rows of spines.

There seems little doubt that Johnson described the adult of Lowe's *longipinnis*, which was a half-grown specimen 456 mm. long. *T. asper* was founded on a young specimen, length not stated.

On the other hand, *T. raschii* Esmark 1861 would seem to be a different species, as his specimen measuring 334 mm. (or about 400 mm. including tail) is much shallower in the body (depth $2\frac{1}{2}$ in length), and the dorsal and anal fins very much less elevated, than in the South African specimen of 350 mm.

Fam. 28. Pteraclidae.

Body oblong, more or less elevated, strongly compressed, with rather large, thin, adherent, cycloid scales. Scales lobate, with persistent median ridge or spine. Mouth moderate, very oblique, protractile only in young. Maxilla broad. Teeth cardiform in a single row or in bands in jaws, present or absent on vomer, palatine ; absent on tongue. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. A single dorsal fin, very long, very high, composed wholly of spines, which are simple, non-articulate, unbranched (except the last one), the anterior ones often short and graduated. Anal similar to dorsal. Both dorsal and anal scaleless, but with a conspicuous basal sheath consisting of a single row of large scales. Ventrals jugular, of a spine and 5 rays, with axillary process. Pectoral moderate. Caudal forked. Air-bladder small. Pyloric caeca few. Lateral line obsolete, or nearly so.

A small family of pelagic fishes closely related to the *Bramidae* and remarkable for their elevated sail-like dorsal and anal fins. Very few specimens are known, and most of the species are known only from single specimens.

The scales are notable in being more or less lobate ; those on the sides of the body and caudal peduncle each bearing a hooked spine, which fits into a notch in the preceding scale, as in the genus *Taractes* in the family *Bramidae*.

Key to the South African genera.

1. Dorsal fin beginning on snout in front of eye . . . . . *Pteraclis.*
2. Dorsal fin beginning behind eye . . . . . *Pterycombus.*

Gen. Pteraclis Gron.

1763. Gronovius, Zoophyl., p. 136.

1772. *Id.*, Acta Helvetica, vol. vii, p. 44.

1800. Lacépède, Hist. Nat. Poiss., vol. ii, p. 512 (*Oligopodus*).

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 359.

1901. Jordan and Snyder, J. Coll. Sci. Tokyo, vol. xv, p. 306 (*Bentenia*).

1919. Jordan, Ann. Carn. Mus., vol. xii, pp. 331–333.

Body rather elongate. Dorsal fin beginning far forward on snout in front of eye, with 2–4 graduated spines in front, the 1st elongate spine more or less conspicuously thickened. Anal similar. No teeth on palate.

Bentenia has one of the dorsal and anal spines notably thickened, *Pteraclis* apparently has the spines not or only slightly thickened. The distinction seems scarcely of generic importance, especially when so little is really known about these forms. Jordan remarks that the two are in other respects very close to one another.

Key to the South African species.

1. Depth $3\frac{1}{4}$ in length . . . . . *ocellatus.*
2. Depth $4\frac{1}{2}$ in length . . . . . *velifera.*

**Pteraclis ocellatus* C. and V..

1833. Cuvier and Valenciennes, *loc. cit.*, p. 363, pl. cc'xxi,

1829. Cuvier, Règne Anim., Ill. Poiss., pl. lxvi, fig. 2.

1919. Jordan, *loc. cit.*, p. 332, pl. lviii (after C. and V.).

Depth of body equal to length of head, $3\frac{1}{4}$ in length. Eye 3 in length of head. Maxilla reaching nearly to below hind margin of eye. D XLV–XLVI, commencing at a distance from premaxillary symphysis equal to about eye-diameter, 1st spine very short, 2nd and 3rd rather longer, 4th elongate, $\frac{3}{4}$ length of body, 7th about as long as body, succeeding ones gradually decreasing. A XLII, commencing below hind margin of preopercle, 1st spine short, succeeding ones graduated to 5th, which equals longest dorsal spine. Scales: l.ser. 50–52; tr.ser. 17. Lateral line apparently distinct.

Length.—70 mm.

Colour.—Silvery, dorsal and anal fins blackish, with a blue spot at top of dorsal, pectoral and caudal yellow.

Locality.—Mozambique Channel, 30° S. lat.

Type in Paris Museum.

Pteraclis velifera (Pall.).

1767. Pallas, Spicil., vol. viii, p. 19, pl. iii, fig. 1.

1833. Cuvier and Valenciennes, *loc. cit.*, p. 370 (*guttatus*).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 411.

1919. Jordan, *loc. cit.*, pl. lv (after Bonnaterre).

Depth (not including fin sheaths) $4\frac{1}{2}$, length of head 5, in length of body. Eye 4 in length of head, a little larger than snout. Maxilla reaching to below hind margin of pupil. Teeth in a single series in both jaws, 4–5 in a single row on each palatine, 2 in a longitudinal line on vomer. Gill-rakers 6 on lower part of anterior arch, widely spaced, with spinules on their inner edges, a smaller one just above bend. D ca. LV, commencing at a distance from premaxillary symphysis equal to $\frac{1}{3}$ eye-diameter, 1st spine very short, 2nd 10 mm., 3rd 15 mm., 4th 23 mm., equal to eye, 5th stout, about 110 mm., other spines mutilated. A ca. L, 1st apparently lost, 2nd 20 mm., 3rd stout, 80 mm., other spines mutilated. Scales strongly lobate : l.ser. ca. 50 ; tr.ser. 16 or 17 (not including fin-sheaths). The scales from behind pectoral each with a hooked, backwardly directed spine. Whole head, except snout and lower jaw, scaly.

Length.—520 mm.

Colour (as preserved).—Traces of silver on body, dorsal and anal fins blackish.

Locality.—St. Helena Bay.

Distribution.—Indian Ocean.

This old and rather badly mutilated specimen from the Old Museum collection described above seems to be referable to Pallas' species. Lowe's *P. papilio* from Madeira is excluded as having considerably fewer dorsal and anal spines. In any case it is certainly referable to *Bentenia* as defined by Jordan, having one spine in both the dorsal and anal fins notably enlarged.

Gen. Pterycombus Fries.

1837. Fries, K. Ver. Ak. Handl. Stockh., pp. 14, 22.

1892. Smitt, Skand. Fish., vol. i, p. 72.

1919. Jordan, Ann. Carn. Mus., vol. xii, p. 331.

Body short. Dorsal fin beginning behind eye, with 10–13 graduated spines in front, none of the spines thickened. Anal with about 4 short graduated spines, the next spine abruptly longer. No teeth on palate or tongue.

Centropholis Hilg. 1878 may possibly be synonymous with this genus, the difference in height of the anal scarcely being a generic character, judging by the figures of *P. brama* and *C. goodei* given by Jordan (*loc. cit.*, pls. lvii and lviii), though the former appears to have a few (? 3) short anal spines followed by one *abruptly* longer. The present species differs from both in having falcate dorsal and anal fins, but is nearer to *Pterycombus*.

Pterycombus falcatus n. sp.

Depth (at level of vent, and not including scaly sheath of dorsal) $2\frac{1}{2}$, length of head 4, in length of body. Eye nearly twice snout, slightly greater than interorbital width, $3\frac{1}{3}$ in length of head. Maxilla reaching to below centre of eye. Gill-rakers 7 on lower part of anterior arch, the front one shorter than the others, one small one just above the bend, all set with spinules on their upper (inner) edges. D XLIX, commencing above hind margin of eye, the anterior spines very short, but gradually increasing in length to 8th which equals diameter of eye, 9th nearly twice 8th, 10th $2\frac{2}{3}$ times 8th, 11th 3 times 9th, 12th–14th $\frac{2}{3}$ length of body, the succeeding spines decreasing rapidly to the last, which equals diameter of eye. A XLI, commencing below scaly base of pectoral, 1st spine very short, 2nd twice 1st, 3rd twice 2nd, 4th $2\frac{1}{2}$ times 3rd, 5th and 6th abruptly longer, equal to longest dorsal spines, succeeding spines decreasing rapidly to last, which is equal to last dorsal spine. P 20, upper two rays spine-like, stouter than the others, longest equal to length of head. Ventral slightly longer than diameter of eye. Scales : 48 along middle of side from point of opercle (not counting small scales on base of caudal), 20 from dorsal to vent behind pectoral (not counting sheath scale) ; nearly all the scales with a hooked spine directed backwards, except those on the hind part of body and caudal peduncle, the change of direction occurring at the level of about the 43rd dorsal spine. Four rows of spiniferous scales on each side of caudal peduncle. Whole head, except snout, interorbital, supraorbital, anterior part of preorbital, lower jaw, and angle of preopercle, scaly. Dorsal, anal, and caudal completely scaleless. (Plate XXV, fig. 1.)

Length.—300 mm.

Colour.—Uniform bright silver, the fins (as preserved) pale horn-colour, the tips and margins of dorsal and anal brownish, iris silvery, pupil presumably black.

Locality.—Cape seas, exact locality lost, but very probably cast ashore in Table Bay.

Type in South African Museum.

Although very closely related to the North Atlantic *P. brama* Fries 1837 this specimen appears to represent a distinct species, characterised by the falcate dorsal and anal fins. Compare the figures given by Smitt (*loc. cit.*, p. 73, fig. 21) and Shufeldt (Proc. Biol. Soc. Wash., vol. xxv, pl. ii, and reproduced in Jordan, *loc. cit.*, pl. lvii). Smitt also states that the caudal fin is scaly as in *Brama*, thus affording another mark of distinction. The type specimen of *P. brama* is 384 mm. long, so that it would seem the present specimen does not represent the adult form of the N. Atlantic form.

The specimen is also very similar to *Centropholis ledanoisi* Belloc (1926, Bull. Mus. d'Hist. Nat. Paris., p. 271) from the N. Atlantic, and may possibly prove to be synonymous. *C. ledanoisi*, however, has slightly different proportions and scale- and fin-formulae, and non-falcate dorsal and anal fins. Belloc makes no mention of the hooked spines on the scales, and his figure is too indistinct to allow one to judge whether they are present or not. Belloc says two of his specimens were "confondus par les pêcheurs" with examples of *Brama raii*; this would seem scarcely possible if the scales were hooked.

The specimen is in perfect condition, except that the pyloric caeca were decomposed and impossible to count.

Fam. 29. Drepanidae.

Similar to the following family *Chaetodipteridae*, but with the mouth protractile, no subocular shelf, elongate, falcate pectoral fins, and cycloid scales. Dorsal spines 9. Pseudobranchiae small, concealed. Caudal rounded or somewhat wedge-shaped.

A single Indo-Pacific genus and species.

Gen. Drepane C. and V.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vii, p. 129.
With the characters of the family.

Drepane punctata (Gmel.).

Sickle-fish ; Concertina-fish.

1793. Gmelin in Linné, Syst. Nat., p. 1243.

1878–88. Day, Fish. India, p. 116, pl. xxix, fig. 5.

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 57, figs. 9, 10 (var. *africana* Osorio).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 371 (references and synonymy).

1925. Fowler, J. Bomb. Nat. Hist. Soc., vol. xxx, p. 321.

1925. *Id.*, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 251.

Dorsal profile of head gently convex, often slightly concave in the nuchal region, and old individuals with a prominent interorbital bump. Depth not quite equal to length, length of head 3 in length of body. Eye 3–4 in length of head, $1\frac{1}{4}$–$1\frac{1}{2}$ in snout, 1–$1\frac{1}{2}$ in depth of preorbital. Gill-rakers 10 on lower part of anterior arch. D (VIII–)IX 21–22, 1st 3 spines (especially 1st) very small, 4th longest, as long, or nearly as long, as head. A III 18–19. Longest soft rays of dorsal and anal about as long as head. Pectoral elongate, falcate, reaching base of caudal fin. Scales : l.l. 50–55 ; l.tr. $\frac{14–15}{32–33}$. (Plate XXVI, fig. 2.)

Length.—Up to 375 mm.

Colour.—Silvery, with a golden or violaceous sheen, uniform or with a series of narrow vertical black bars or series of spots, prominent in young but obsolescent in adult ; fins pale or yellowish, soft dorsal often with a longitudinal series of dark spots, one between each ray, often also with a dusky margin like the anal fin.

Locality.—Natal coast, Delagoa Bay, Chinde.

Distribution.—Indo-Pacific to Australia, west coast of Africa southwards to Angola.

A common fish, eaten by the native races in most parts, but not esteemed by Europeans.

The var. *africana* Osorio merely has uninterrupted black bands, and is found among the Natal specimens as well as elsewhere, and is not peculiar to the West African coast.

Fam. 30. Chaetodipteridae.

(*Ephippidae*).

Body deep, strongly compressed, with small ctenoid scales. Mouth small, terminal, not, or scarcely, protractile. Maxilla mostly con-

cealed. Subocular shelf broad (*Chaetodipterus*) or very feeble (*Platax*). Teeth pointed or tricuspid, movable, in bands in jaws; teeth occasionally on vomer, but none on palatines. Nostrils paired. Gill-membranes broadly united with isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present, small, sometimes concealed. Gill-rakers very short. A single dorsal fin, deeply notched in *Chaetodipterus*, with 3–9 spines, folding into a grove or more or less completely hidden in a scaly sheath. Anal with 3 spines. Soft portions of dorsal, anal, and caudal scaly. Pectoral short. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal truncate or emarginate. Air-bladder present. Pyloric caeca few. Lateral line single.

Small fishes from warm seas, allied to the *Chaetodontidae*, found mostly on rocky shores or among coral reefs, carnivorous.

Key to the South African genera.

1. One or more of the dorsal spines elongate . . . . *Chaetodipterus.*
2. All the dorsal spines short, concealed . . . . . *Platax.*

Gen. Chaetodipterus Lacép.

1802. Lacépède, Hist. Nat. Poiss., vol. iv, p. 503.

1817. Cuvier, Règne Anim. (*Ephippus*).

Dorsal fin deeply notched between spinous and soft portions, the former with 9 spines folding in a groove, the 1st two short, the 3rd or 3rd–5th elongate, flexible. Soft dorsal and anal moderately prolonged in young, more or less falcate in adult. Caudal emarginate. Pseudobranchiae concealed.

Tropical Atlantic and Indo-Pacific.

Like the Chaetodonts the species of this genus pass through a *Tholichthys* stage (see p. 607). During the course of growth remarkable changes in the body-form and coloration occur, which have led to the institution of several nominal species.

The Asiatic species have smaller scales and have been separated under the genus *Ephippus*. As this appears to be the only difference, the necessity for the two genera may be questioned. In any case, *Chaetodipterus* is the older name, and must determine the family name.

Key to the South African species.

1. Scales : l.tr. $\frac{10–12}{20–23}$ . . . . . *goreensis.*
2. Scales : l.tr. $\frac{7}{15}$ . . . . . *orbis.*

Chaetodipterus goreensis (C. and V.).

Spade-fish.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vii, p. 125, pl. clxxviii.

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 228 (*faber*, non Broussonet).

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 55, figs. 7, 8.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 367 (*faber*, non Broussonet).

Dorsal profile of head nearly straight, except for a slight antorbital prominence, meeting the ventral profile at an angle of 90° or a little more. Depth $1\frac{2}{5}$–$1\frac{1}{3}$, length of head $3\frac{1}{2}$, in length of body. Eye $3\frac{1}{2}$–$3\frac{3}{4}$ in length of head, $1\frac{1}{2}$ in length of snout, slightly less than interorbital width, and $1\frac{1}{3}$ to nearly $1\frac{1}{2}$ in depth of preorbital. Teeth all tricuspid, the cusps subequal, or the centre one slightly larger than the laterals. Gill-rakers 10 on lower part of anterior arch. D IX 20, 1st two spines short, 3rd–5th elongate, the 3rd longest, nearly twice length of head. A III 17–18. Anterior rays of dorsal and anal subequal, and nearly as long as head. Ventrals reaching vent, 1st ray filamentously prolonged, reaching origin of anal fin. Scales: l.l. ca. 45; l.tr. (from origin of dorsal to vent) $\frac{12\text{–}13}{23\text{–}24}$.

Length.—Up to 230 mm.

Colour.—Silvery, top of head brownish, 5–6 faint brownish vertical bands, a series of longitudinal streaks along each row of scales, appearing (as preserved) either darker or of a more brilliant silver according to the angle at which the light strikes; fins dusky, the elongate dorsal spines and their membranes burnished silver, lobe of soft anal brownish, ventrals blackish.

Locality.—Natal coast, Delagoa Bay.

Distribution.—Tropical west coast of Africa.

The above description is taken from the specimen identified by Gilchrist and Thompson as *faber*, and another slightly smaller. These specimens are certainly not referable to *faber* (Atlantic coast of tropical N. and S. America), and should possibly be considered as a new species. They approach, however, very closely to *goreensis*, differing only in the extra anal rays and scales in transverse series (*goreensis*: A III 15–16. Scales: l.tr. $\frac{10\text{–}11}{20\text{–}21}$).

Pellegrin (*loc. cit.*) figures two stages. The younger, 74 mm., has the 3rd dorsal spine only slightly longer than the head, and the cross-bands very distinct. The larger, 162 mm., has the 3rd–6th dorsal spines elongate, the 3rd and 4th extending to the base of the caudal, and the cross-bands less distinct. Cuvier and Valenciennes describe and figure a specimen a foot long, which has the 3rd (2nd as they count) dorsal spine about as long as the head.

If the Natal specimens be considered as *goreensis*, it would seem that the dorsal spines increase in length and flexibility from the young up to the half-grown fish, and then decrease again in old individuals.

The distribution may be compared with that of *Drepane punctata*.

According to a MS. name in the Museum register book, Gilchrist and Thompson apparently intended to describe this species as distinct under the name "*robinsoni*," and if the specific distinctness were confirmed, this name might be suitably employed to mark the interest displayed by Mr. R. Robinson in collecting our South African fishes.

**Chaetodipterus orbis* (Bl.).

1785. Bloch, Ausl. Fische, vol. iii, p. 81, pl. xxii, fig. 2, and Bloch Schneider, Syst. Ichthyol., p. 232, pl. ccii, fig. 2.

1877. Bleeker, Atl. Ichthyol., vol. ix, p. 20, pl. ccclxv, fig. 5 (references).

1878–88. Day, Fish. India, p. 115, pl. xxix, fig. 4.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321.

Profile evenly convex, passing into the ventral profile without any angle. Depth $1\frac{1}{3}$, length of head $3\frac{1}{4}$, in length of body. Eye $2\frac{1}{3}$ in length of head, slightly greater than snout, than interorbital width, and than depth of preorbital. D IX 19–20, 1st two spines very short, 3rd–5th elongate, the 3rd longest, $1\frac{1}{2}$ times length of head. A III 15–16. Longest soft dorsal and anal rays subequal, about $\frac{2}{3}$ length of head. Scales : l.l. 42 ; l.tr. $\frac{7}{15}$. (Plate XXVI, fig. 5.)

Length.—Up to 190 mm.

Colour.—Silvery, greyish or greenish above, young with 4 dark cross-bands, fins diaphanous or whitish with dusky margins.

Locality.—Natal coast.

Distribution.—Indian seas to Malay Archipelago.

Easily distinguished by the even curve of the front profile and the smaller number of scales in transverse series.

Gen. Platax Cuv.

1817. Cuvier, Règne Anim.

Dorsal fin not notched, the spinous portion with 3–7 (usually 5) spines increasing in length posteriorly and almost completely concealed in a scaly sheath. Soft dorsal and anal usually much prolonged or falcate. Caudal truncate. Ventrals very long in young, becoming shorter in adult. Pseudobranchiae small, but not concealed.

Indian seas to Japan and Australia.

The form of the body undergoes remarkable changes, in consequence of which several nominal species have been instituted. *P. novemaculeatus* McCull. (1916, "Endeavour" Sci. Res., vol. iv, p. 188, pl. lv, fig. 1) has 9 dorsal spines and would appear to be a *Chaetodipterus*.

Willey (Spolia Zeylan., vol. ii, p. 52, fig., 1904) records the resemblance of a young *P. vespertilio* to a leaf, both in colour and in its habit of sinking inertly on its side through the water.

Key to the South African species.

1. Anterior profile of head evenly convex; vomerine teeth; 40–45 scales from beginning of lateral line to 1st dorsal spine . . . . . *teira.*
2. Anterior profile angular at snout; no vomerine teeth; 25–30 scales from beginning of lateral line to 1st dorsal spine . . . . *vespertilio.*

Platax teira Forsk.

Sea-bat.

1775. Forskal, Descr. Anim., p. 60.

1877. Bleeker, Atl. Ichth., vol. ix, p. 73, pl. ccclxxix, fig. 2 (adult), pl. ccclxxxii, fig. 1 (young).

1878–88. Day, Fish. India, p. 235, pl. li, B, fig. 4.

1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, p. 526 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 371 (references).

Anterior profile of head evenly convex, snout not projecting. Depth about equal to length in adult, greater than length in young, length of head 3–4 in length of body. Eye $2\frac{1}{2}$–4 in length of head, about $1\frac{1}{3}$ in snout, and $1\frac{1}{2}$ to nearly 2 in interorbital width. The three cusps of the teeth about equal. A small patch of pointed teeth on the vomer. Gill-rakers 8–9 on lower part of anterior arch. D V 28–34. A III 24–28. The soft dorsal and anal very elevated and falcate in young, becoming shorter and more obtuse in adult. Ventrals reaching to base of caudal

or beyond in young, in adult not much longer than length of head. Scales : l.l. ca. 60 ; 40–45 between beginning of l.l. and 1st dorsal spine. (Plate XXXI, fig. 6.)

Length.—Up to 500 mm.

Colour.—Yellowish, greyish, or brownish, with 3 dark vertical bands, one through eye, one through base of pectoral, and the third and broadest covering the posterior half of the body (but not the caudal peduncle), these bands conspicuous in young, but disappearing in adult ; fins yellowish or fuscous, tips of dorsal and anal more or less blackish, ventrals black.

Locality.—Natal coast, Delagoa Bay, Mozambique.

Distribution.—Indo-Pacific to Japan and Australia.

**Platax vespertilio* (Bl.).

1785. Bloch, Ausl. Fische, vol. iii, p. 67, pl. cxcix, fig. 2.

1877. Bleeker, Atl. Ichth., vol. ix, p. 74, pl. ccclxxix, fig. 1 ; pl. ccclxxx, figs. 2, 3.

1878–88. Day, Fish. India, p. 236, pl. li, B, fig. 5.

1903. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lv, p. 161.

Anterior profile angular, the profile of snout and chin meeting at an obtuse angle. Depth about equal to length in adult, greater in young, length of head 3–4½ in length of body. Eye 2¼–3½ in length of head, 1–1⅓ in interorbital width. The median cusp of the teeth stronger than the lateral ones. No vomerine teeth. Gill-rakers on lower part of anterior arch. D V 35–38. A III 26–29. The soft dorsal and anal not so elevated as in *teira*, becoming more obtuse in adult. Ventrals long in young, shorter in adult. Scales : l.l. ca. 60 ; 25–30 between beginning of l.l. and 1st dorsal spine.

Length.—Up to 310 mm.

Colour.—Similar to that of *teira*, but the dark bands usually not so prominent, especially the hindmost one, which is usually only a narrow band, usually a dark cross-band on base of caudal.

Locality.—Mozambique.

Distribution.—Indian seas, East Indies.

Fam. 31. Chaetodontidae.

Butterfly or Coral Fishes.

1923. Ahl, Arch. Naturg. Berl., Abt. A, vol. lxxxix, Hft. 5, p. 1 (revision).

Body ovate-oblong or deep ovate, compressed, with large, moderate,

or small, more or less ctenoid scales. Mouth small, terminal, protractile. Maxilla small, mostly concealed. Subocular shelf present. Teeth setiform, in narrow bands in jaws, none on vomer or palatines. Nostrils paired. Gill-membranes more or less attached to isthmus. Gills 4, a slit behind 4th. Pseudobranchiae well developed. Gill-rakers very short. A single dorsal fin, with well-developed spinous portion. Anal with 3(–4) spines. Soft dorsal and anal densely scaly. Pectoral short. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal usually truncate or rounded-truncate. Air-bladder present. Pyloric caeca few or in moderate number. Lateral line single.

A numerous family of tropical carnivorous fishes, particularly abundant among coral reefs, and notable for their varying and brilliant coloration and markings.

The young pass through a stage called the "*Tholichthys*," in which the head is covered with enlarged bony shields and there are strong suprascapular and preopercular spines.

Key to the South African genera.

1. Preopercle unarmed (adult). Scales comparatively large.
   a. Fourth dorsal spine greatly prolonged, filamentous . . *Heniochus.*
   b. Fourth dorsal spine not prolonged . . . . . *Chaetodon.*
2. Preopercle with a strong spine . . . . . *Holacanthus.*

Gen. Heniochus C. and V.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vii, p. 92.

Body elevated, with bony protuberance on either forehead or neck, or both, in adult. Snout short. Preopercle unarmed. Dorsal spines 11–13, the 4th greatly elongate and filamentous. Anal spines 3. Scales moderate sized. Pyloric caeca few.

Indo-Pacific to Japan and Australia.

Heniochus macrolepidotus (Linn.).

Coachman ; Angle-fish.

1758. Linné, Syst. Nat., ed. 10, p. 274.

1878–88. Day, Fish. India, p. 110, pl. xxviii, fig. 3.

1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, p. 542.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 370 (references).

1923. Ahl, Arch. f. Naturg., Abt. A, vol. lxxxix, p. 33.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 252 (*acuminatus*).

Depth $1\frac{1}{3}$–$1\frac{3}{5}$, length of head $2\frac{4}{5}$–$3\frac{1}{5}$, in length of body. Eye $3\frac{1}{3}$–$3\frac{1}{2}$ in length of head. A granulose or spinulose projection at upper anterior margin of orbit in adult; none on neck. D XI–XII 23–27, 4th spine ending filamentously, equalling or often exceeding length of fish. A III 17–18. Scales: l.l. 48–55; l.tr. $\frac{10–12}{22–24}$.

Length.—Up to 230 mm.

Colour.—Silvery or yellowish-white, snout and a bar across forehead blackish, one broad black band from origin of dorsal through pectoral to belly, another from hind part of spinous dorsal to hind part of anal, filament of dorsal fin white, soft dorsal, pectorals, caudal, and anterior half of soft anal yellow, ventrals and anal spines black.

Locality.—Natal, Delagoa Bay, Mozambique.

Distribution.—Indo-Pacific to Japan and Australia.

This fish gets its first vernacular name from the Greek name of the genus, and the second from the resemblance of the 4th dorsal spine to an angler's rod, though it does not use this filamentous streamer as does the Angler-fish (*Lophius*).

Gen. Chaetodon (Art.) Linn.

1738. Artedi, Genera, p. 51, (non binomial).

1758. Linné, Syst. Nat., ed. 10, p. 272.

1829. Cuvier, Règne Anim., ed. 2, p. 189.

1868. Günther, Ann. Mag. Nat. Hist., p. 457 (*Tholichthys*, larva).

1923. McCulloch, Rec. Austr. Mus., vol. xiv, p. 1 (key to Australian species.)

1923. Ahl, Arch. Naturg., Abt. A, vol. lxxxix, p. 44.

Body deep, very strongly compressed, without protuberances on head. Snout short. Preopercle unarmed. Dorsal spines 12–13(14), the middle ones higher than the front or hind ones, none of them elongate. Anal spines 3. Scales large or moderate sized. Pyloric caeca few.

All tropical seas.

Various attempts have been made to subdivide this large genus, but none of them appear to be successful. So far as the South African fauna is concerned, any subdivision is quite unnecessary as the species are so few.

Key to the South African species.

I. Scale-rows below l.l. as well as those above running obliquely upwards and backwards.
  A. One of the dorsal rays prolonged . . . . . *setifer.*
  B. None of the dorsal rays prolonged.
    1. A dark wedge-shaped band from opercle to base of spinous dorsal *lunula.*
    2. No dark wedge-shaped band between opercle and dorsal.
      a. Ocular band about equal to eye-diameter.
        i. No black spot on back . . . *vagabundus.*
        ii. Two black triangular spots on back . . *falcula.*
      b. Ocular band much narrower than eye-diameter . *melanotus.*
II. Scale-rows below l.l. horizontal.
  A. Soft dorsal and anal black . . . . . *xanthocephalus.*
  B. Fins yellow . . . . . *marleyi.*
III. Scale-rows below l.l. running obliquely downwards and backwards *kleini.*

Chaetodon setifer Bl.

Whip Butterfly-fish.

1785. Bloch, Ichth., pl. cdxxvi, fig. 1.

1801. Bloch Schneider, Syst. Ichth., p. 225.

1878–88. Day, Fish. India, p. 106, pl. xxvii, fig. 3 (*auriga* var. *setifer*).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 364, pl. xlvii.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 369 (references and synonymy).

1923. Ahl, Arch. Naturg., Abt. A, vol. lxxxix, p. 147 (*auriga*), and p. 148 (subsp. *setifer*).

Profile concave above snout, which is pointed. Depth $1\frac{1}{2}$–$1\frac{2}{3}$, length of head $2\frac{2}{3}$–$3\frac{1}{3}$, in length of body. Eye 3–$3\frac{3}{4}$ in length of head. D XII–XIII 23–26, 6th ray (5th and 6th or 6th and 7th sometimes) prolonged beyond the others as a filament, increasing in length with age. A III 20–21. Scales: l.l. 40–44; l.tr. (origin of dorsal to belly) $\frac{6\text{–}7}{13\text{–}15}$. Rows below as well as those above l.l. running obliquely upwards and backwards. (Plate XXVI, fig. 6.)

Length.—Up to 200 mm.

Colour.—Silvery or yellowish, with 5–6 dark narrow stripes running obliquely upwards, and 9–10 obliquely downwards, a black band from nape through eye to angle of interopercle, narrower and fainter above

eye than below ; fins yellow, a large black ocellus on about the 7th–14th dorsal rays, soft dorsal with narrow black margin, anal with white margin and a fine black submarginal line, a white bar edged with brown across caudal.

Locality.—Natal and Zululand coast, Mozambique.

Distribution.—Indo-Pacific to Japan and Australia.

C. auriga Forsk. 1775 is mentioned in Playfair and Günther (Fish. Zanz., p. viii) as occurring at Mozambique. This species resembles *setifer* in the filamentous dorsal ray, but instead of the round or oval ocellus it has " an oblique cuneiform blackish band from the origin of the soft dorsal to the posterior part of the anal." *C. setifer* is often regarded (Day ; Weber ; Ahl) as a variety of the older species.

Chaetodon lunula (Lacép.).

Lunate Butterfly-fish.

1802. Lacépède, Hist. Nat. Poiss., vol. iv, pp. 507, 510, 513.

1873–75. Günther, Fische d. Südsee, vol. i, p. 42, pl. xxxiii, figs. A–D (adult and young).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 366, pl. liv (adult), and fig. 160 (young).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 368 (references).

1923. Ahl, Arch. Naturg., Abt. A, vol. lxxxix, p. 114.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 251.

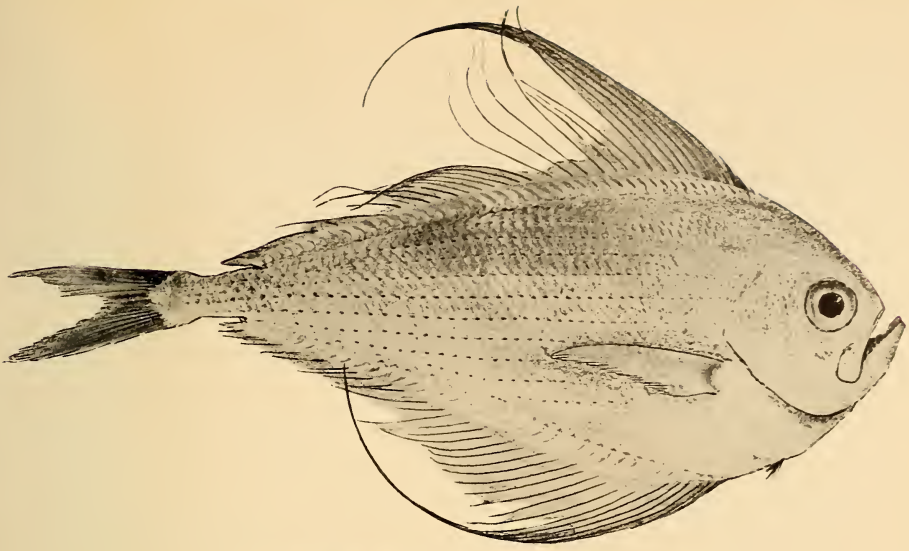
Profile concave, snout pointed. Depth $1\frac{2}{5}$–$1\frac{2}{3}$, length of head about 3, in length of body. Eye $2\frac{3}{4}$–3 in length of head. D XII 23–24. A III 18–19. Scales : l.l. 36–40 ; l.tr. $\frac{9\text{–}10}{17\text{–}19}$. Rows below l.l. running obliquely upwards and backwards.

Length.—Up to 200 mm.

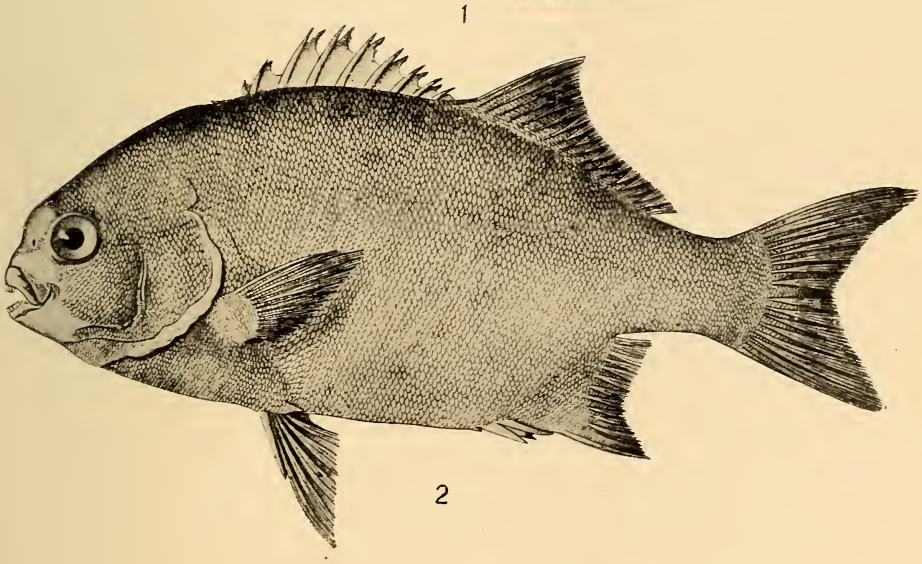
Colour.—Yellow ; a black band from interorbital through eye to lower margin of preopercle, wider than eye ; behind this a silvery white band from nape over opercle ; a narrow triangular or wedge-shaped black bar from 6th and 7th dorsal spines to upper margin of opercle, bordered above and below with white ; oblique series of red spots, more or less united, following the lines of scales on sides ; fins yellow, spinous and soft dorsal and anal with black margins, a reddish band along middle of soft dorsal and anal, an ill-defined black band starting from origin of dorsal and running along base of dorsal to

PLATE XXV.

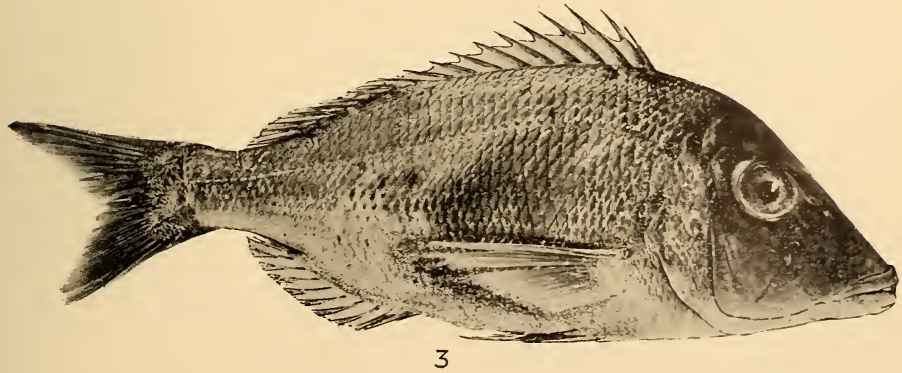
FIG.		TEXT-PAGE
1.	*Pterycombus falcatus* n. sp. (original photo)	599
2.	*Dipterodon capensis* C. and V. (after C. and V.)	635
3.	*Lethrinus nebulosus* (Forsk.) (original photo)	633



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caudal peduncle, where it ends in an enlarged well-defined ocellus; caudal with a red, followed by a black cross-bar and a white margin. In the young the upper half of the body is more or less suffused with blackish, and there is a black ocellus on the soft dorsal, which gradually migrates to the margin and is eventually absorbed into the black margin, as in *vagabundus*.

Locality.—Natal coast.

Distribution.—Indo-Pacific to China and Australia.

Chaetodon vagabundus Linn.

Wandering Butterfly-fish.

1758. Linné, Syst. Nat., ed. 10, p. 276.

1878–88. Day, Fish. India, p. 105, pl. xxvii, fig. 1.

1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, p. 532.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 369 (references).

1923. McCulloch, Rec. Austr. Mus., vol. xiv, p. 3, pl. i, figs. 1, 2 (young).

1923. Ahl, Arch. Naturg., Abt. A, vol. lxxxix, p. 153.

Profile concave above snout, which is pointed. Depth $1\frac{1}{3}$–$1\frac{1}{2}$, length of head $2\frac{1}{2}$ (young)–$3\frac{1}{2}$, in length of body. Eye $2\frac{1}{2}$ (young)–$3\frac{1}{2}$ in length of head. D XII–XIII 25–26. A III 20–21. Scales: l.l. 40–45; l.tr. $\frac{5\text{–}6}{12\text{–}14}$. Rows below as well as those above l.l. running obliquely upwards and backwards.

Length.—Up to 150 mm.

Colour.—Silvery or yellowish, with a series of 6 narrow dark stripes running obliquely from head to base of spinous dorsal, the lowermost abutting against about 11 similar stripes running in the reverse direction to the base of anal; a blackish vertical stripe from origin of dorsal through eye to angle of interopercle, equal in width to eye; fins yellow, a black band from upper part of anterior dorsal rays across the soft dorsal and caudal peduncle on to hind end of anal, soft dorsal with black margin, anal with white margin and narrow black submarginal band, caudal with two black cross-bars. In the young there is a large black ocellus on the soft dorsal, which is gradually pushed outwards until it becomes merged in the black margin seen in the adult.

Locality.—Natal and Zululand coasts, Delagoa Bay, Mozambique.

Distribution.—Indo-Pacific to Japan and Australia.

The application of the name is not clear ; it is not a more widely distributed species than, e.g. *setifer*.

**Chaetodon falcula* Bl.

Two-spot Butterfly-fish.

1785. Bloch, Ausl. Fische, vol. ix, p. 102, pl. cdxxv (pl. cdxxvi, fig. 2).

1878–88. Day, Fish. India, p. 104, pl. xxvi, fig. 5.

1923. Ahl, Arch. Naturg., Abt. A, vol. lxxxix, p. 170.

Profile concave, snout prominent, pointed. Depth about $1\frac{1}{2}$, length of head $2\frac{2}{3}$, in length of body. Eye nearly 4 in length of head. D XII–XIII 24–28. A III 21–23. Scales : l.l. 25(–28) ; l.tr. $\frac{6-7}{12-14}$. Scales below l.l. running obliquely upwards and backwards.

Length.—Up to 200 mm.

Colour.—Reddish-lilac, becoming pale yellow posteriorly and on the fins ; several narrow, dark, vertical streaks ; 2 large triangular black patches on back, the first from 2nd–5th dorsal spines to lateral line or a little below, the second at end of spinous and beginning of soft dorsal to a little below lateral line ; a black band, slightly narrower than eye-diameter, from interorbital through eye to chest ; a black band on caudal peduncle ; soft dorsal and anal and caudal with black intramarginal band and white margin.

Locality.—Mozambique.

Distribution.—Indian seas, East Indies.

**Chaetodon melanotus* Bl. Schn.

Black-backed Butterfly-fish.

1801. Bloch Schneider, Syst. Ichth., p. 224.

1878–88. Day, Fish. India, p. 108, pl. xxviii, fig. 1.

1923. Ahl, Arch. Naturg., Abt. A, vol. lxxxix, p. 128 (references).

Profile concave, snout pointed. Depth $1\frac{1}{2}$, length of head 3, in length of body. Eye 3 in length of head. D XII–XIII 19–22. A III 16–20. Scales : l.l. 37–40 ; l.tr. $\frac{6}{14-16}$. Rows below l.l. running obliquely upwards and backwards.

Length.—Up to 157 mm.

Colour.—Yellowish, brownish-black above, with dark oblique lines

following the rows of scales ; a black band, much narrower than eye, from interorbital through eye to chest, a black more or less interrupted band over caudal peduncle ; fins yellow, soft dorsal and anal and caudal with a narrow black intramarginal band, margin white or greyish.

Locality.—Mozambique.

Distribution.—Indo-Pacific to China.

**Chaetodon xanthocephalus* Benn.

Black-finned Butterfly-fish.

1832. Bennett, Proc. Zool. Soc. Lond., p. 182.

1855. Peters, Wiegm. Archiv., p. 246 (*nigripinnis*=juv.).

1861. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 32 (*nigripinnis*).

1878–88. Day, Fish. India, p. 104, pl. xxvi, fig. 4.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 260, pl. xxix, fig. 4 (*nigripinnis*).

1898. Jatzow and Lenz, Voeltzkow's Reise. Abh. Senckenb. Ges., vol. xxi, p. 503 (*nigripinnis*).

1923. Ahl, Arch. Naturg., Abt. A, vol. lxxxix, p. 68.

Profile nearly straight or slightly concave above snout, which is not very pointed. Depth $1\frac{1}{2}$, length of head 3, in length of body. Eye $3\frac{1}{3}$ in length of head. D XIV 24. A III 23. Scales : l.l. 36. Rows below the l.l. horizontal.

Length.—Up to 200 mm.

Colour.—Yellow, a narrow black band from nape through eye to interopercle, becoming obsolete in adult ; pectorals, ventrals, and caudal yellow, a large black patch covering the soft dorsal and posterior 5 spines, a similar patch on the anal, soft dorsal and anal margined with yellow.

Locality.—Mozambique.

Distribution.—East coast of Africa, India.

Chaetodon marleyi Regan.

Marley's Butterfly-fish.

1921. Regan, Ann. Durban Mus., vol. iii, pt. 1, p. 1.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 23.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 251.

Profile slightly concave above the pointed snout. Depth $1\frac{1}{3}$–$1\frac{1}{2}$. length of head 3–$3\frac{1}{3}$, in length of body. Eye 3–$3\frac{1}{2}$ in length of head.

D XI 23–25. A III 17–19. Scales: l.l. 40–45; l.tr. $\frac{7}{19\text{–}20}$. Rows on lower half of body horizontal.

Length.—Up to 140 mm.

Colour.—Silvery, each scale on body with a lemon-yellow centre, forming lines, oblique on upper half, horizontal on lower half, of body; a dark median stripe from snout to interorbital; a dark, light-edged band from nape through eye to interopercle, slightly narrower than eye; a broader dark band from 3rd–5th dorsal spines through pectoral to ventrals, and a similar band from junction of spinous and soft dorsal to middle of anal, at the dorsal end of the latter band on last spine and first 3 rays an oval black ocellus; a dark bar on caudal peduncle; fins pale yellowish, soft dorsal and anal with a narrow black-and-white border, ventrals dusky, caudal with a dark, light-bordered cross-bar, convex anteriorly.

Locality.—False Bay, Agulhas Bank to East London and Natal, down to 50 fathoms.

Type in British Museum.

Closely related to the Atlantic *striatus* Linn., under which name specimens have been in the South African Museum for many years. It seems to be specially common at Mossel Bay.

Chaetodon kleini Bl.

Klein's Butterfly-fish.

1785–95. Bloch, Ausl. Fische, vol. iv, p. 7, pl. xxviii, fig. 2.

1797. Bloch, Ichth., pl. ccxviii, fig. 2.

1801. Bloch Schneider, Syst. Ichth., p. 225.

1877. Bleeker, Atl. Ichth., vol. ix, p. 45, pl. cccIxxiii, fig. 3.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 258.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 368.

1923. Ahl, Arch. Naturg., Abt. A, vol. lxxxix, p. 144.

Profile concave above snout, which is pointed. Depth $1\frac{1}{2}$, length of head 3, in length of body. Eye $2\frac{1}{3}$–3 in length of head. D XII–XIII 22–25. A III 18–20. Scales: l.l. 30–33; l.tr. $\frac{6}{12}$. Rows below l.l. running slightly downwards and backwards.

Length.—Up to 125 mm.

Colour.—Yellow, snout blackish, a black band the width of the eye

from nape through eye to throat and base of ventrals, a broad band from spinous dorsal to ventral, and a broader one from soft dorsal to anal; these two latter bands usually present but sometimes quite indistinct or even absent; fins yellow, soft dorsal and anal with fine black marginal line.

Locality.—Natal coast, Mozambique.

Distribution.—Indian seas, East Indies, to China and Australia.

A specimen from Mozambique had no trace of the two broad dusky bands when freshly caught.

Gen. Holacanthus Lacép.

1803. Lacépède, Hist. Nat. Poiss., vol. iv, p. 525.

1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, p. 544.

1915. Ogilby, Mem. Queensl. Mus., vol. iii, p. 99.

Body oblong or rather elevated, compressed but rather robust, without protuberances on head. Snout short. Preopercle with strong spine at angle and often serrations on lower and hind margins. Preorbital often serrate, and sometimes also with strong spines. Dorsal spines 12–15, usually increasing in height posteriorly, with or without a procumbent spine in front. Anal spines 3. Caudal lunate, truncate, or rounded. Scales small or moderate, rough, often intermixed with smaller ones. Pyloric caeca in moderate number (about 22).

All tropical seas.

The genus is here diagnosed in its wide sense, as the attempts to separate the numerous species into subgenera have not proved too successful as yet.

The synonymy of the various species even needs extricating and revising.

Key to the South African species.

1. Preorbital without spines.
   - *a.* Strongly curved pale bands. Caudal rounded . . *nicobariensis.*
   - *b.* Feebly curved pale bands. Caudal truncate . . . *striatus.*
2. Preorbital with a strong spine (*Xiphypops*) . . . . . *acanthops.*

Holacanthus nicobariensis (Bl. Schn.).

1801. Bloch Schneider, Syst. Ichth., p. 219, pl. 50.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vii, p. 191, pl. clxxxiii (*semicirculatus*).

1873–75. Günther, Fische d. Südsee, vol. i, p. 54, pl. xli, fig. B.

1877. Bleeker, Atl. Ichth., vol. ix, p. 69, pl. cccIxx, fig. 5 (*semicirculatus*), and p. 69, pl. cccIxv, fig. 1 (*nicobariensis*).

1878–88. Day, Fish. Ind., p. 112, pl. xxviii, fig. 6.

1915. Ogilby, *loc. cit.*, p. 110 (*semicirculatus*) (references).

1918. Regan, Proc. Zool. Soc. Lond., vol. i, p. 192, fig. (*semicirculatus*) (colour changes).

Depth $1\frac{2}{3}$–$1\frac{3}{4}$, length of head $3\frac{1}{3}$–$3\frac{1}{3}$, in length of body. Eye about 3 in length of head. Preorbital not denticulate. Hind and lower margins of preopercle feebly serrated, spine short, $\frac{1}{4}$–$\frac{1}{3}$ length of head. D XIII–XIV 20–23, spines increasing in height posteriorly. A III 19–21. Soft dorsal and anal with rounded outline. Caudal rounded. Scales small, not mixed with smaller ones.

Length.—Up to 150 mm.

Colour.—Dark bluish or violaceous, with alternate whitish and bluish narrow cross-bands more or less crescentic, and breaking up into spots or forming a network on soft dorsal and anal fins; caudal with pale cross-bars, the hinder ones more or less discontinuous and vermiculate. In the young the bands are fewer and the posterior half of the caudal is clear. The ground colour in the adult is paler, with small dark spots. Regan (*loc. cit.*) states that the fully adult fish is *lepidolepis* Blkr. without any cross-bands at all. Playfair and Günther (1866, Fish. Zanz., p. 38) also state that the adult of *alternans* lacks the bars, but retains the spots.

Locality.—Mozambique.

Distribution.—Indo-Pacific to N. Australia.

H. lepidolepis Blkr., unlike *alternans* and *semicirculatus*, has the preorbital denticulate, and the soft dorsal and anal pointedly produced.

Holacanthus striatus Rüpp.

Old Woman.

1835. Rüppell, Neue Wirbelt. Fische, p. 32, pl. x, fig. 2.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 161 (*rhomboides*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 371 (*rhomboides*).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321.

Depth $1\frac{1}{2}$–$1\frac{3}{5}$, length of head $3\frac{1}{2}$ (not 4), in length of body. Eye 3–4 in length of head. Preorbital not denticulate, but with a small point on antero-inferior angle. Preopercle with hind margin denticulate, spine at angle short, $\frac{1}{2}$ eye-diameter, lower margin with 1 or

2 small points. D XII 23–24, spines increasing in height posteriorly. A III 22–23. Soft dorsal and anal rounded-quadrangular, hind margins vertical. Caudal truncate. Scales: large and small ones intermixed.

Length.—Up to 290 mm.

Colour (as preserved).—Dark brown, with a darker spot in the middle of the larger scales; in half-grown examples there are several narrow, light, vertical, slightly curved (the convexity in front) bluish lines.

Locality.—Natal coast.

Distribution.—Indo-Pacific.

Type of *rhomboides* in South African Museum.

H. striatus Rüpp. is usually considered to be the young form of *nicobariensis* (*semicirculatus*), but this cannot be so if the half-grown (about 140 mm.) specimens I have seen are identified with Rüppell's species. The differences between these specimens and *nicobariensis* of similar size are found not only in the degree of curvature of the light bands, but in the length of the preopercular spine, which is shorter in the former, and in the fins. The dorsal spines lengthen much more rapidly in *nicobariensis*, and are not so evenly graduated, the soft dorsal and anal are rounded as compared with the squarish outline of the Natal specimens, and the caudal is rounded.

These half-grown specimens are clearly the same species as the adult described as *rhomboides*.

**Holacanthus acanthops* Norm.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 318.

Depth 2, length of head $3\frac{1}{4}$, in length of body. Eye $2\frac{1}{4}$ in length of head. Preorbital with a strong backwardly directed spine, $\frac{1}{4}$ length of head. Preopercle denticulate on hind margin, angle with a strong spine slightly more than $\frac{1}{3}$ length of head. D XIV 16, 3rd spine longest. A III 17. Soft dorsal rounded, anal obtusely pointed. Caudal subtruncate. Scales moderate sized, 4 from origin of dorsal to l.l.

Length.—36 mm.

Colour.—Head, back, caudal, dorsal, and pectoral fins yellow, rest of fish dusky brown, dorsal with narrow dark edge.

Locality.—Natal coast.

Type in British Museum.

Allied to the Hawaiian *fisheri* Snyder 1902, for which Jordan and Jordan (1922, Mem. Carn. Mus., vol. x, p. 64) have proposed the generic name *Xiphypops*.

Fam. 32. Scatophagidae.

Body deep ovate, compressed, with very small ctenoid scales. Mouth small, terminal, not protractile. Maxilla concealed. Suboocular shelf present. Teeth setiform, movable, tricuspid, in bands in jaws; none on vomer or palatines. Nostrils paired. Gill-membranes forming a fold across isthmus, to which they are narrowly attached. Gills 4, a slit behind 4th. Pseudobranchiae present, not concealed. A single dorsal deeply notched between spinous and soft portions, the former with 11 spines. Anal with 4 spines. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal truncate. Air-bladder present. Pyloric caeca about 20. Lateral line single.

A single genus, with two species, from the Indo-Pacific and Australian regions, often entering rivers.

According to Weber (*loc. cit. infra*) these fishes when young pass through a true "*Tholichthys*" stage like the Chaetodonts.

Gen. Scatophagus C. and V.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vii, p. 136.

With the characters of the family.

Scatophagus argus (Gmel.).

Stront-vis.

1793. Gmelin in Linné, Syst. Nat., p. 1248.

1802. Lacépède, Hist. Nat. Poiss., vol. iv, p. 727; and vol. iii, pl. xxv, fig. 2 (*tetracanthus*).

1877. Bleeker, Atl. Ichth., vol. ix, p. 21, pl. cccIxiii, fig. 2 (synonymy).

1878–88. Day, Fish. Ind., p. 114, pl. xxix, fig. 3 (references).

1907. Seale and Bean, Proc. U.S. Nat. Mus., vol. xxxiii, p. 246, fig. 8 (young).

1913. Weber, Siboga Exp. Monogr., 57, p. 302, pl. x, figs. 1–5 (young stages).

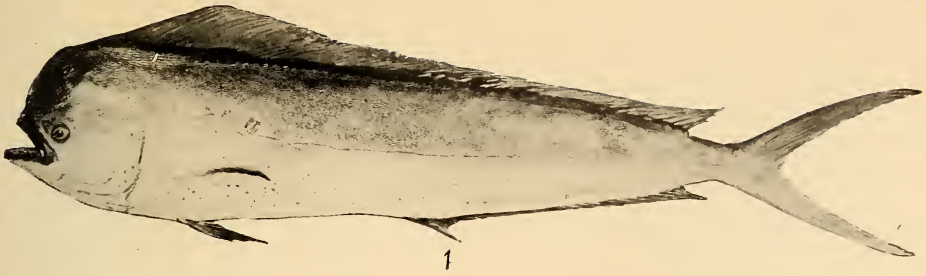
1924. Hora, Mem. As. Soc. Beng., vol. vi, p. 490, fig. 5 (young).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 250 (*Ephippus tetracanthus*).

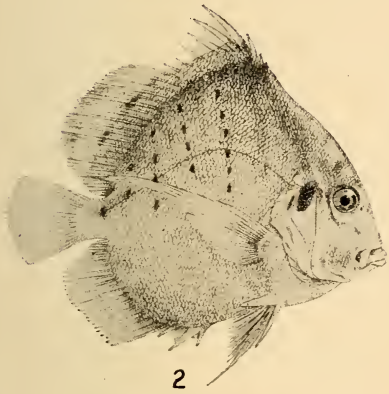
Body oval in young, becoming more oblong in adult, the antero-dorsal profile rising sharply to the origin of dorsal. Depth $1\frac{1}{2}$, length of head $2\frac{1}{6}$ (young)–$3\frac{1}{2}$ (adult), in length of body. Eye $2\frac{1}{2}$ (young)–$3\frac{3}{4}$

PLATE XXVI.

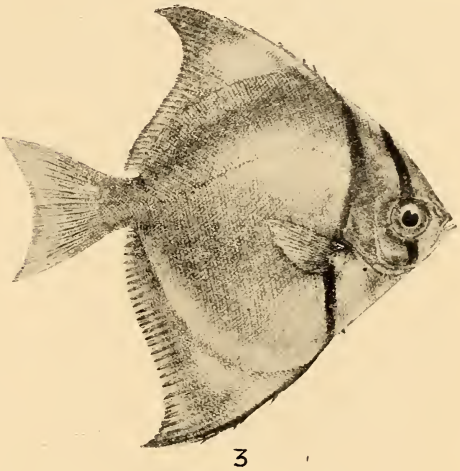
FIG.		TEXT-PAGE
1.	*Coryphaena hippurus* Linn. (original photo)	566
2.	*Drepane punctata* (Gmel.) (after Day)	601
3.	*Monodactylus argenteus* (Linn.) (after Day)	640
4.	*Scatophagus argus* (Gmel.) (after Day)	618
5.	*Chaetodipterus orbis* (Bl.) (after Day)	604
6.	*Chaetodon setifer* Bl. (after Day)	609
7.	*Liognathus equula* (Forsk.) (after Day)	624



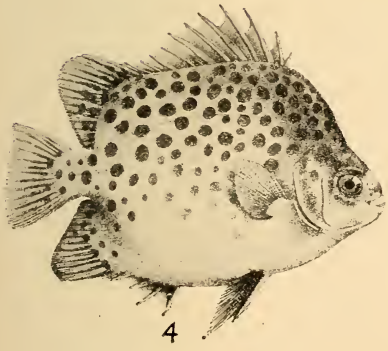
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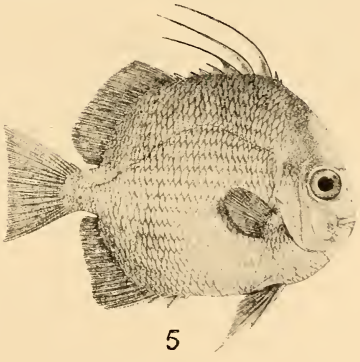
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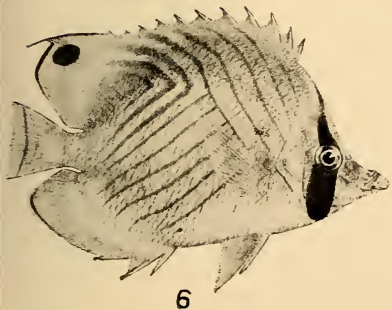
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(adult) in length of head, equal to (adult) or greater than (young) snout, in adult 1½ in interorbital width. Gill-rakers 4–5 on lower part of anterior arch, very short, almost rudimentary. D XI 15–16, 3rd or 4th spine longest. A IV 14–15. Outermost ventral ray filamentously produced. Margins of soft dorsal and anal fins subvertical. Scales: ca. 22 between origin of dorsal and highest part of l.l. (Plate XXVI, fig. 4.)

Length.—Up to 300 mm.

Colour.—Greyish or yellowish, with silvery or violaceous or bronzy iridescence; either with numerous small round spots, which may be irregularly disposed or aggregated into more or less distinct and continuous vertical narrow bands (typical *argus*), or with 6 rather broad vertical cross-bands, the 1st through eye, 2nd across nape, 3rd and 4th from spinous dorsal, 5th from soft dorsal, 6th across caudal peduncle (var. *tetracanthus*); fins rosy or dusky, spinous dorsal either margined with blackish or wholly blackish, ventrals dark or light.

Locality.—Delagoa Bay.

Distribution.—Indo-Pacific to Australia, entering estuaries and rivers.

The Delagoa Bay specimens belong to the form named by Lacépède *tetracanthus*, and later by Cuvier and Valenciennes *fasciatus*.

The "*Tholichthys*" larval stage has the head covered with large bony shields right to the origin of the dorsal fins; the postorbital is enlarged and thickened and is followed by a strong suprascapular spine; the preopercle is produced at the angle with 1–3 strong spines. The skin is covered with minute setiform scales.

Owing to its frequent habit of feeding on foul substances this fish is usually not eaten, even by the native populations.

Fam. 33. Histiopteridae.

1907. Jordan, Proc. U.S. Nat. Mus., vol. xxxii, p. 235 (synopsis of genera).

Body oblong, ovate, or elevated, strongly compressed, with small, rough, ctenoid scales. Bones of the head rough with radiating striae, granules, and spinules. Mouth small, terminal, protractile. Maxilla exposed behind, without supplemental bone. Subocular shelf present. Teeth villiform in jaws, and sometimes on vomer, but none on palatines. Nostrils paired. Gill-membranes separate, free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present (in *Histiopterus*).

A single dorsal fin, strongly elevated, spines 4–14, strong, rough, not depressible in a groove, soft portion long or short. Anal spines 2–5, soft portion short. Soft dorsal and anal scaleless. Ventrals thoracic, of a stout spine and 5 rays, with axillary process. Caudal lunate or truncate. Air-bladder present. Pyloric caeca numerous. Lateral line single.

A small family of rather large, carnivorous fishes from Japan, Australasia, and South Africa. Owing to the strongly marked specific differences, a number of monotypic genera have been instituted, which are really quite unnecessary and will probably be combined again in the future.

These fishes are good eating, but owing to their rarity and habitat in rather deep waters, they are not often captured.

Key to the South African genera.

1. Spinous dorsal much shorter than soft portion . . . *Histiopterus.*
2. Spinous dorsal much longer than soft portion.
   a. D XIV, A IV . . . . . *Pseudopentaceros.*
   b. D XII, A V . . . . . *Quinquarius.*

Gen. Histiopterus Schl.

1843. Schlegel in Temminck and Schlegel, Faun. Jap. Poiss., p. 86.
1907. Jordan, Proc. U.S. Nat. Mus., vol. xxxii, p. 236.
1907. *Id.*, *ibid.*, p. 237 (*Evistias*).

Body elevated. Snout produced. Dorsal high, soft portion of dorsal much longer than spinous portion, which has 4 spines, the 3 much stronger than the 4th. Anal spines 3. Caudal truncate or slightly emarginate. No vomerine teeth.

Japan and South Africa.

Histiopterus spinifer Gilchr.

1904. Gilchrist, Mar. Invest. S. Afr., vol. iii, p. 3, pl. xxi (young).
1916. Thompson, Mar. Biol. Rep., vol. iii, p. 134.
1921. Regan, Ann. Mag. Nat. Hist., (9), vol. vii, p. 412 (adult).
1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 70.
1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 243.

Depth $1\frac{2}{5}$ (juv.)–$1\frac{7}{8}$ (adult), length of head $2\frac{2}{5}$–$2\frac{4}{5}$, in length of body. Eye $1\frac{1}{4}$–$1\frac{3}{4}$ in snout, $3\frac{1}{2}$–4 in length of head, greater than or equal to interorbital width. In the young, spinose tubercles on the median line

of occiput, and on supraorbital, preorbital, suprascapular and angle of preopercle ; these disappear in adult. Both lips, and especially chin, thickly set with cutaneous papillae or short barbels in adult, feebly developed in young. Chin with 6 pores, the posterior one on each side rather large. Gill-rakers 15–17 on lower part of anterior arch. D IV 25–26, first 2 spines short, 3rd strongest, $\frac{1}{2}$ (adult)–$\frac{4}{5}$ (juv.) depth of body, 4th more slender, in young considerably longer than 3rd, in adult slightly longer or slightly shorter than 3rd, rays higher anteriorly, equal to (juv.) or $\frac{2}{3}$ (adult) depth of body, margin of fin straight or slightly convex. A III 9–10, 2nd spine stronger and longer than 3rd. Ventral rays reaching to base of caudal fin in young, to origin of anal in adult. Caudal slightly emarginate. Scales : l.l. 64–68. Pyloric caeca 5. (Plate XXXI, fig. 2.)

Length.—Up to 350 mm.

Colour.—Dark brown, uniform in young, in adult with 5–6 obscure, dark, broad, vertical bands ; soft dorsal, anal, and ventrals blackish.

Locality.—Mossel Bay to Natal, 25–230 fathoms.

Type (juv.) in South African Museum ; type of adult in British Museum.

One young specimen, scarcely larger than the type, has none of the spinose tubercles on the head, except a slight keel on the occipital.

The stomach contents of two adult examples consists exclusively of the skeletal plates of Ophiuroids (mainly of the genus *Ophiura*), with occasional fragments of Echinoid tests.

Gen. Pseudopentaceros Gill.

1876. Bleeker (*apud* Jordan, Classif. Fish., p. 199, 1923).

1893. Gill, Mem. Ac. Sci. Wash., vol. vi, p. 116 (*apud* McCulloch " Endeavour " Sci. Res., vol. iii, p. 144, 1915).

1907. Jordan, Proc. U.S. Nat. Mus., vol. xxxii, p. 236 (*Gilchristia*).

Body oblong. Snout short. Soft portion of dorsal fin of 9–10 rays, much shorter than spinous portion which has 14 spines. Anal spines 4. Caudal truncate or slightly rounded in young. Teeth on vomer. Triangular space between ventrals and throat much narrower than long.

South Africa and New Zealand.

**Pseudopentaceros richardsoni* (Smith).

1849. Smith, Illustr. Zool. S. Afr. Pisces, pl. xxi (ventral spine much too short).

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 212.

1890. Hutton, Tr. N. Zeal. Inst., vol. xxii, p. 277.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 134.

1923. McCulloch, Rec. Austr. Mus., vol. xiv, p. 18, pl. iv, fig. 1 (young).

Depth $2\frac{1}{3}$ (young)–$2\frac{2}{3}$ (adult), length of head $2\frac{3}{4}$ (young)–$3\frac{2}{3}$ (adult), in length of body. Eye 3 (young) to nearly 4 (adult) in length of head, slightly greater than (young) or slightly less than (adult) snout. D XIV 9–10, 4th or 4th–6th spines longest, as long as head in young, about $\frac{1}{2}$ length of head in adult. A IV 8–9. Ventrals reaching vent in young, considerably shorter in adult. Caudal truncate in adult. Scale-counts not given by Richardson, Günther, or McCulloch. Scales on breast, belly, and nape tubercular or subangular, pavement-like, not imbricate.

Length.—Up to 525 mm.

Colour.—Bluish or slaty-grey, darker above, body and head with greenish, violaceous, or pinkish reflections, dorsal brownish, purplish towards base, anal, caudal, and ventrals yellowish-grey; in the young there are irregular dark markings tending to form rings on the back and sides, spinous dorsal and anal and whole of ventrals blackish.

Locality.—Off Cape Point.

Distribution.—New Zealand.

Type (dried skin) in British Museum.

Only the type specimen is known from South African waters, the few other known specimens coming from New Zealand.

Gen. Quinquarius Jord.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iii, p. 30 (*Pentaceros* non Schultze 1760).

1907. Jordan, Proc. U.S. Nat. Mus., vol. xxxii, pp. 236, 238.

1907. *Id., ibid.*, p. 236 (*Quadrarius*).

1915. McCulloch, " Endeavour " Sci. Res., vol. iii, p. 144.

Body oblong. Snout short. Soft portion of dorsal fin of 12–15 rays, much shorter than spinous portion, which has 10–12 spines. Anal spines 4–5. Caudal truncate or emarginate, rounded in young. Vomer with or without teeth. Triangular space between ventrals and throat as broad as long.

South Africa, Japan, S. Australia, and Pacific.

**Quinquarius capensis* (C. and V.).

1829. Cuvier and Valenciennes, *loc. cit.*, vol. iii, p. 30, pl. xliii.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 134.

1922. Gilchrist, Fish. Mar. Biol. Surv. Spec. Rep., iii, p. 70.

Depth $1\frac{3}{4}$, length of head $2\frac{3}{4}$, in length of body. Eye 3 in length of head. Teeth on vomer. A strong, horn-like projection above each eye on the interorbital space. D XII 12, 3rd and 4th spines longest, $\frac{1}{2}$ depth of body. A V 7. Scales on throat and belly keeled, granular, not imbricate. Pyloric caeca 9.

Length.—75 mm.

Colour.—Silvery yellow, with irregular brown markings, fins yellowish.

Locality.—Cape seas ; Natal coast, 164 fathoms.

Type originally in the Leiden Museum, but now neither there nor in Paris Museum.

The type is obviously a young specimen, and it is probable that the horns above the eyes disappear in the adult.

Besides the type only one other specimen is known, namely that obtained by the s.s. *Pickle* off the Natal coast. In spite of the interest attaching to this specimen, Gilchrist (*loc. cit.*) gives no details concerning it.

Fam. 34. Liognathidae.

Body ovate or oblong, compressed, with small or moderate-sized cycloid scales, often concealed under a covering of mucus. Mouth very protractile, the premaxillary shafts very long. Maxilla without supplementary bone, its extremity exposed. Teeth villiform in jaws, none on vomer or palatines. Nostrils paired. Gill-membranes free from or attached to isthmus. Gills 4, a slit behind 4th. Pseudobranchiae absent. A single dorsal fin, more or less notched, depressible in a basal sheath, with 8–10 spines, 1st short, 2nd longest. Anal short or rather long, with 2–5 spines, 1st short, also with basal sheath. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal forked. Lateral line single, sometimes incomplete. Air-bladder present. Pyloric caeca few or rudimentary.

A family of small coastal fishes from tropical and subtropical seas, sometimes ascending rivers. They are eaten by the native populations, but have no economic value.

Key to the South African genera.

1. Gill-membranes attached to isthmus. Anal long, with 14 rays (*Liognathinae*).
   a. No canines . . . . . *Liognathus.*
   b. Canines present . . . . . *Gazza.*
2. Gill-membranes free from isthmus. Anal short, with 7–9 rays (*Gerrinae*) *Xystaema.*

Gen. Liognathus Lacép.

1802. Lacépède, Hist. Nat. Poiss., vol. iv, p. 448.

1817. Cuvier, Règne Anim. (*Equula*).

Gill-membranes united with isthmus. Bony ridges on top of head, occiput, and nape. Mouth typically horizontal, when protracted pointing downwards, sometimes oblique. Dorsal spines 8. Anal spines 3, 2nd much stouter than 3rd, 14 rays. A series of more or less prominent spines along bases of soft dorsal and anal. Pectoral short. Teeth minute, no canines. Scales very small. Head scaleless. Skin more or less slimy.

Indian seas and Malay Archipelago, often ascending rivers.

Key to the South African species.

1. Breast naked. Mouth horizontal . . . . . *equula.*
2. Breast scaly. Mouth oblique . . . . . *insidiator.*

Liognathus equula (Forsk.).

Slimy.

1795. Forskal, Desc. Anim., p. 58.

1797. Bloch, Ichthyol., pl. cdxxviii (*edentulus*).

1878–88. Day, Fish. India, p. 238, pl. lii, fig. 1 (*edentula*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 352.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 218 (references and synonymy).

Dorsal profile rather more convex than ventral. Depth $1\frac{3}{4}$–$1\frac{4}{5}$, length of head $3\frac{1}{5}$–$3\frac{1}{4}$, in length of body. Eye $2\frac{3}{4}$–$3\frac{1}{4}$ in length of head, subequal to snout and to interorbital width. Two spines above the eye. Supraorbital ridge and lower margin of preopercle feebly denticulate. Mouth horizontal. Gill-rakers 14–15 on lower part of anterior arch. D VIII 15–16, 2nd spine about $\frac{3}{4}$ length of head, 3rd and 4th serrate on their anterior basal margins. A III 14. Scales: l.l. (tubes) about 60. Breast naked. (Plate XXVI, fig. 7.)

Length.—Up to 300 mm.
Colour.—Silvery, soft dorsal and base of pectoral usually greyish.
Locality.—Natal, Delagoa Bay, Chinde.
Distribution.—Indian seas, East Indies.

Liognathus insidiator (Bl.).

Spotted Slimy.

1797. Bloch, Ichth., pl. cxcii, figs. 2, 3.
1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 504.
1878–88. Day, Fish. India, p. 242, pl. li, C, fig. 5.
1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.
1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii (*Secutor ruconius*).

Ventral profile more convex than dorsal. Depth 2, length of head $3\frac{1}{3}$, in length of body. Eye $2\frac{1}{2}$ in length of head, rather larger than snout and interorbital width. Two minute spines above eye. Supra-orbital ridge and lower margin of preopercle minutely denticulate. Mouth oblique. Gill-rakers 17–18 on lower part of anterior arch. D VIII 15–16, 2nd and 3rd spines subequal, $\frac{1}{2}$ length of head. A III 14. Lateral line usually obsolete on caudal peduncle. Breast scaly, at least in adult.

Length.—Up to 100 mm.

Colour.—Silvery, darker above, a series of spots forming irregular dark vertical bars ; tip of spinous dorsal, axil of pectoral, and a dark bar from eye to throat blackish ; pectoral and caudal yellowish.

Locality.—Natal, Delagoa Bay, Chinde.

Distribution.—Indian seas, East Indies.

Fowler's specimens would appear to be this species. The true *ruconius*, if maintained as a separate species, differs in having distinctly larger scales, which are very deciduous.

Gen. Gazza Rüpp.

1835. Rüppell, Neue Wirbelt. Fische, p. 3.

Gill-membranes united with isthmus. Bony ridges on top of head, occiput, and nape. Mouth oblique. Dorsal spines 8. Anal spines 3, 2nd a little stouter than 3rd, 14 rays. The series of spines along bases of soft dorsal and anal less conspicuous than in *Liognathus*. Pectoral short. Teeth conical in a single row, the two front ones in

upper jaw and several in the lower jaw enlarged, canine-like. Scales very small. Head scaleless. Skin more or less slimy. Pseudobranchiae small, more or less concealed. Two processes on shoulder-girdle projecting into gill-chamber.

Indian seas to Southern Pacific, often entering rivers. Besides the species here mentioned, which has several synonyms, there appears to be only one other really distinct species, namely, *achlamys* Jord. and Starks 1917, from Ceylon.

Gazza minuta (Bl.).

1797. Bloch, Ichth., pl. cdxxix, fig. 2.

1801. Bloch Schneider, Syst. Ichth., p. 96 (*argentaria*).

1835. Rüppell, *loc cit.*, p. 4, pl. i, fig. 3 (*equulaeformis*).

1835. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. x, p. 91 (*dentex*).

1844. Forster, Descr. Anim., ed. Lichtenstein, p. 288 (*argentaria*).

1853. Bleeker, Nat. Tyds. Ned. Ind., vol. iv, p. 260 (*tapeinosoma*).

1876–81. Günther, Fische d. Südsee, vol. ii, p. 144, pl. xci, fig. B (*argentaria*).

1913. Weber, Siboga Exp. Monogr., 57, p. 270.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 353 (*equulaeformis*) (references).

1917. Jordan and Starks, Ann. Carn. Mus., vol. xi, p. 444.

1918. Regan, Ann. Durban Mus., vol. ii, pt. 2, p. 76.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 219.

Depth 2 (young)–2½ (adult), length of head 2⅘ (young)–3⅓ (adult), in length of body. Eye 2⅘–3 in length of head, greater than snout and interorbital width. One or two minute spines above eye. Supraorbital ridge and lower margin of preopercle minutely denticulate. Gill-rakers 14–16 on lower part of anterior arch. D VIII 16, spines slender, 2nd ⅔ length of head. A III 14. Scales : l.l. (tubes) about 60. Anterior part of back scaly, breast naked.

Length.—Up to 170 mm.

Colour.—Silvery, darker above, often with irregular wavy, dark, vertical bars above lateral line ; axil of pectoral black, fins fleshy or yellowish, margin of dorsal greyish.

Locality.—Natal, Delagoa Bay.

Distribution.—Indian seas, East Indies, S. Pacific.

Gen. Xystaema J. and E.

1829. Cuvier, Règne Anim., ed. 2, vol. ii, p. 104 (*Gerres* part).
1895. Jordan and Evermann, Proc. Calif. Ac. Sci., p. 471.
1907. Jordan, Proc. U.S. Nat. Mus., vol. xxxii, p. 246.

Gill-membranes free from isthmus. No bony ridges on top of head. Preopercle and preorbital entire. Dorsal spines 9. Anal spines 3, 2nd not very much stouter than 3rd, 7–9 rays. Pectoral long. Second interhaemal spine not hollowed, not receiving end of air-bladder; long, spear-like. Scales moderate. Head scaly.

Key to the South African species.

A. Second dorsal spine greatly prolonged . . . . *punctatum.*
B. Second dorsal spine not prolonged.
  1. Dorsal rays higher than hindermost spines.
    a. Length of head less than depth of body.
      i. L.l. 35–38 . . . . . *oyena.*
      ii. L.l. 40–45 . . . . . *acinaces.*
    b. Length of head about equal to depth of body . . *oblongus.*
  2. Dorsal rays equal to hindermost spines . . . . *rappi.*

Xystaema punctatum (C. and V.).

Long-spine Pouter.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 480.
1830. *Id., ibid.*, p. 482 (*filamentosus*).
1854. Bleeker, Nat. Tyds. Ned. Ind., vol. vi, p. 195 (*macracanthus*).
1878–88. Day, Fish. India, p. 98, pl. xxv, fig. 3 (*filamentosus*).
1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 351 (references).
1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 244 (*filamentosus*).

Depth 2–2$\frac{3}{5}$, length of head 3–3$\frac{2}{5}$, in length of body. Eye 2$\frac{4}{5}$–3$\frac{1}{2}$ in length of head, about equal to snout and to interorbital width. Maxilla extending to below anterior border of eye. Gill-rakers 7 on lower part of anterior arch. D IX 10–11, 2nd spine greatly prolonged, often reaching end of dorsal fin and exceeding depth of body; succeeding spines rapidly decreasing, rays higher than posterior spines. A III 7–8. Scales: l.l. 42–45; l.tr. $\frac{5-6}{11-13}$; 3 rows on cheek. Lower pharyngeal bones not fused, without molariform teeth.

Length.—Up to 235 mm.

Colour.—Silvery, bluish or greyish above, with numerous oblong horizontal blue or dark spots forming irregular lines, young with more or less distinct vertical dark bars ; snout and margin of spinous dorsal blackish, anal and soft dorsal greyish, other fins yellowish.

Locality.—Natal, Delagoa Bay.

Distribution.—Indian seas, East Indies.

**Xystaema oyena* (Forsk.).

Striped Pouter.

1775. Forskal, Descr. Anim., p. 35.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 467, pl. xix, fig. 1 (*longirostris*).

1866. Günther in Playfair and Günther, Fish. Zanz., p. 110, pl. xvi, fig. 2 (*lineolatus*).

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 129, pl. ccclxi, fig. 5.

1878–88. Day, Fish. India, p. 99, pl. xxv, fig. 4.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 243, pl. xxxvi, A, fig. 2.

1913. Weber, Siboga Exp. Monogr., 57, p. 273.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 352 (references, sed non Gilchrist and Thompson 1909) (*lineolatus*).

Depth $2\frac{1}{3}$–$2\frac{3}{4}$, length of head 3–$3\frac{2}{5}$, in length of body. Eye $3\frac{1}{4}$–$3\frac{3}{4}$ in length of head, equal to snout and to interorbital width. Maxilla extending to below anterior border of eye. Gill-rakers 6–7 on lower part of anterior arch. D IX 10, 2nd spine not prolonged, about $\frac{1}{2}$ depth of body, soft rays higher than posterior spines. A III 7. Scales : l.l. 35–38 ; l.tr. $\frac{5–6}{11}$; 3 rows on cheek. Lower pharyngeal bones not fused, without molariform teeth.

Length.—Up to 230 mm.

Colour.—Silvery, with a series of more or less distinct dark longitudinal stripes, margin of dorsal dusky, fins pale.

Locality.—Mozambique.

Distribution.—Indo-Pacific.

Klunzinger (1871, Verh. Zool. Bot. Gesell. Wien, vol. xx, p. 772) states that this species comes into the shallow water in sandy bays and harbours in large shoals to spawn (in the Red Sea during April). They lay their eggs in the sand and mud. This latter observation requires confirmation.

When the shoals are pursued by larger fishes they bury themselves in the sand on their sides, leaving only one eye and the tail uncovered.

Their food is said to be the sand and mud (with the contained organisms), which the fish absorbs by burrowing with its snout, the body being kept in a vertical position during the process.

Xystaema acinaces (Blkr.).

Pouter.

1854. Bleeker, Nat. Tyds. Ned. Ind., vol. vi, p. 194.

1876. *Id.*, Atl. Ichthyol., vol. viii, p. 126, pl. ccclxi, fig. 2.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 245.

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 227 (*lineolatus* non Gnthr.).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 245.

Distinguished from *oyena* only by having l.l. 40–45.

Locality.—Natal and Zululand coast, Delagoa Bay.

Distribution.—East coast of Africa, Madagascar, East Indies.

Sauvage (*loc. cit.*) expresses the opinion that *acinaces* and *lineolatus* will very probably prove to be synonymous with *oyena*.

All the South African Museum specimens are rather strongly marked, as in *lineolatus*, but possess the scaling of *acinaces*.

**Xystaema oblongus* (C. and V.).

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 479.

1873–75. Günther, Fische d. Südsee, vol. i, p. 30, pl. xxiv, fig. A (*gigas*).

1878–88. Day, Fish. Ind., p. 98, pl. xxv, fig. 2.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 244.

Depth of body about equal to length of head, 3–3⅓ in length of body. Eye 3½–3¾ in length of head, 1–1⅓ in snout. Maxilla extending to below anterior margin of eye. Gill-rakers 8 on lower part of anterior arch. D IX 10, 2nd spine not prolonged, about 1⅓ in depth of body. A III 7. Scales : l.l. 46–50 ; l.tr. $\frac{5}{11}$; 3–4 series on cheek.

Length.—Up to 300 mm.

Colour.—Silvery, darker above, dorsal fin with a blackish margin.

Locality.—Delagoa Bay.

Distribution.—Indian seas, East Indies, S. Pacific.

Xystaema rappi nom. nov.

1861. Rapp in Günther, Proc. Zool. Soc. Lond., p. 142, pl. xxiv. (*longirostris* non Lacép.).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 352 (references) (*longirostris*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 79 (references) (*longirostris*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 244 (*longirostris*).

Depth 2–2¼, length of head 3–3⅕, in length of body. Eye about equal to snout, equal to or slightly less than interorbital width, 3–3½ in length of head. Maxilla reaching slightly beyond anterior margin of eye. Gill-rakers 7 on lower part of anterior arch. D IX 10–11, 2nd spine slightly longer than 3rd, 2½–2⅔ in depth of body, succeeding spines decreasing gradually, soft rays scarcely, if at all, higher than posterior spine. A III 7.

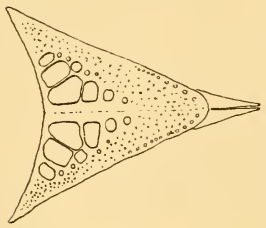


Fig. 21.—Lower pharyngeal teeth of *Xystaema rappi*.

Scales : l.l. 46–48 ; l.tr. $\frac{6}{12}$. Three rows on cheek. Lower pharyngeal bones not completely fused, with a regularly arranged group of flattened molariform teeth on the posterior portion.

Length.—Up to 240 mm.

Colour.—Silvery, with a more or less distinct series of dark longitudinal stripes.

Locality.—Natal coast.

Type in Tübingen Museum.

This species is a close ally of *abbreviatus* Blkr., but is distinguished by the more numerous scales in the lateral line and the less concave margin of the spinous dorsal, though the margin is slightly concave, not even as in Rapp's figure, in which the height of the hinder spines appears to have been exaggerated.

Fam. 35. Lethrinidae.

Body ovate or oblong, compressed, with moderate-sized ctenoid scales. Mouth moderate, terminal, oblique, protractile. Maxilla without supplementary bone, mostly concealed under the broad preorbital. Anterior teeth in jaws villiform, with canines, lateral teeth

conical or obtuse (molariform), in a single series; no teeth on vomer, palatines, or tongue. Nostrils paired. Gill-membranes broadly united, but free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Gill-rakers mostly reduced, knob-like. A single dorsal, the spinous and soft portions subequal. Anal about equal to soft dorsal, with 3 spines. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal lunate or forked. Lateral line single. Air-bladder present. Pyloric caeca few. Subocular shelf small or vestigial.

A small family of three genera, closely related to the *Lutianidae*, and inhabiting the Indo-Pacific region. One species of *Lethrinus* is found on the west coast of Africa.

Gen. Lethrinus Cuv.

1829. Cuvier, Règne Anim., ed. 2, p. 182.

Head large. Snout long, pointed. Preorbital deep. Cheeks and upper surface of head scaleless. Maxilla concealed. D X 9. A III 8. Lateral line tubes simple.

Indo-Pacific, with one species on west coast of Africa. Excellent food-fishes.

A large genus, but many of the so-called species are merely nominal. Differential characters are hard to find in this genus. The formula of the dorsal and anal fins is the same throughout. Bleeker finds the most reliable specific characters in the relative proportions, shape of the profile, number of scales above the lateral line, strength and length of the dorsal spines, and height of anal compared with its length (Atl. Ichthyol., vol. viii, p. 110).

The lateral teeth, which are conical in the young, frequently become obtuse and molariform in the adult.

Key to the South African species.

1. Depth of body less than length of head . . . . . *miniatus.*
2. Depth of body at least equal to, usually greater than, length of head.
   - *a.* Eye moderate. Brownish with blue spots . . . . *nebulosus.*
   - *b.* Eye large. Yellowish . . . . . *borbonicus.*

In addition to the species here mentioned, Playfair and Günther (1866, Fish. Zanz., p. viii) record *violaceus* C. and V. (sic ?=*virescens* C. and V.) and *mahsenoides* C. and V. (? =*insulindicus* Blkr.) from Mozambique. In the present unsatisfactory state of our knowledge of the limits of the species in this genus, it is sufficient merely to note

these records here. Fowler's specimen of *mahsenoides* is probably referable to *nebulosus* (*vide infra*).

Lethrinus miniatus (Forst.).

Long-snouted Scavenger.

1801. Forster, Bloch Schneider, Syst. Ichthyol., p. 281.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 213 (*variegatus*), and p. 220 (*rostratus*).

1866. Playfair in Playfair and Günther, Fish. Zanz., p. 44, pl. vii, fig. 2 (*longirostris*).

1876–77. Bleeker, Atl. Ichthyol., vol. viii, p. 117, pl. cccxxviii, fig. 3; pl. cccxxx, fig. 2 (*variegatus*); and p. 121, pl. cccix, fig. 3.

1878–88. Day, Fish. India, p. 134, pl. xxxiii, fig. 1 (*rostratus*), and p. 787.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 241 (*genivittatus*), and p. 242 (*acutus*).

Depth $2\frac{3}{4}$–$3\frac{2}{3}$, length of head $2\frac{3}{4}$–3, in length of body. Eye $3\frac{1}{3}$ (young)–5 (adult) in length of head, $1\frac{1}{3}$ (young)–2 in snout, 1 (young) –$1\frac{1}{3}$ in interorbital width, and $1\frac{1}{2}$ (adult) in depth of preorbital. Gill-rakers 8 on lower part of anterior arch. Lateral teeth usually remaining conical in adult. Scales: l.l. 48; l.tr. $\frac{5\text{–}6}{16\text{–}18}$.

Length.—Up to 370 mm.

Colour.—Olivaceous or violaceous, with irregular, more or less distinct, narrow, vertical bands or reticulations, or scattered spots; dark bands from eye across preorbital and snout, dorsal mottled, often with a dark spot at base of each spine and ray.

Locality.—Natal coast, Delagoa Bay, Mozambique.

Distribution.—Indian Ocean, East Indies.

Although Bleeker keeps *variegatus* separate from *miniatus* on account of the extra scale above the lateral line in the latter, it would seem that this character is not distinctive. Bleeker's figure (pl. cccxxviii, fig. 3) of *variegatus* corresponds as regards the spots at the base of the dorsal fin with Day's figure of his *miniatus*, and Day gives 4 complete and 2 half series of scales as against Bleeker's $5\frac{1}{2}$. The difference is more verbal than real. I have obtained specimens in the same haul of the net, some with the basal dorsal spots, some without, though owing to immaturity it was impossible to determine whether the presence or absence of such spots was a sexual character.

Lethrinus nebulosus (Forsk.).

Scavenger.

1775. Forskal, Desc. Anim., p. 52.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 289 (*opercularis*).

1876–77. Bleeker, Atl. Ichthyol., vol. viii, p. 119, pl. cccxxxv, fig. 5 (*opercularis*).

1878–88. Day, Fish. India, p. 135, pl. xxxiii, fig. 2 (*karwa*); p. 136, pl. xxxiii, fig. 4 (*nebulosus*); and p. 136 (*opercularis*).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 168 (*scoparius*).

1914. *Id.*, *ibid.*, vol. xiii, p. 69 (*chrysostomus* ? non Rich.).

1916. Ogilby, Mem. Queensl. Mus., vol. v, p. 163 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 360 (also *chrysostomus* sed ? references, and *scoparius*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 241 (*scoparius*), and p. 242 (*mahsenoides*).

Depth $2\frac{1}{2}$ (large specimens)–$2\frac{3}{4}$ (young), length of head $2\frac{4}{5}$–3, in length of body. Eye 4 (young)–5 in length of head, $1\frac{1}{2}$ (young)–$2\frac{1}{3}$ in snout, 1 (young)–$1\frac{1}{3}$ in interorbital width, and $1\frac{1}{4}$ (young)–2 in depth of preorbital. Gill-rakers 5–6 on lower part of anterior arch. Lateral teeth more or less obtuse or molariform in adult. Scales: l.l. 47–48; l.tr. $\frac{6\text{–}7}{17\text{–}19}$. (Plate XXV, fig. 3.)

Length.—Up to 750 mm.

Colour.—Brownish, olivaceous, or greyish, somewhat silvery on belly; head darker or violaceous above, each scale on the back and sides with a cobalt-blue centre, suprascapular scale and some streaks and spots on cheeks also cobalt-blue; fins pale, the edges of the dorsal, anal, and caudal yellowish or reddish, ventrals bluish-grey (especially in young), 1st (uppermost) and basal portion of 2nd pectoral rays blue, distal portion of 2nd reddish, inside of mouth and opercle orange or scarlet.

Locality.—Natal and Zululand coasts, Delagoa Bay, Mozambique.

Distribution.—Indian seas, East Indies to N.E. Australia.

Type of *scoparius* in South African Museum.

The true *chrysostomus* Richardson appears to have only 5 scales above the lateral line (see McCulloch, 1922, Austral. Zoologist., vol. i, p. 87, key).

I have examined a large number of fresh specimens of all sizes from the nets at Delagoa Bay, and feel sure that Fowler's *mahsenoides* is the same species.

**Lethrinus borbonicus* C. and V.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 303.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 204, pl. 21, fig. 2.

1921. British Museum Report, p. 118.

Depth $2\frac{1}{2}$, length of head 3, in length of body. Eye $3\frac{1}{3}$ in length of head, $1\frac{1}{3}$ in snout, and 1 in depth of preorbital. Lateral teeth molariform. Scales : l.l. 48 ; l.tr. ? 5 above lateral line.

Length.—175 mm.

Colour.—Yellowish, with silvery sheen, head brown, mouth and fins reddish.

Locality.—Delagoa Bay (Brit. Mus.).

Distribution.—Réunion.

This species seems to be distinguished by the large eye and short snout.

Fam. 36. Girellidae.

Body oblong-ovate or ovate, compressed, with moderate-sized or small ctenoid scales. Mouth small. Maxilla for the most part concealed under the preorbital, without supplemental bone. Subocular shelf present. Jaws with bands of incisor teeth ; vomer and palatines toothless. Nostrils paired. Gill-membranes scaly, joined to isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. A single dorsal fin. Anal spines 3. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal emarginate. Air-bladder present. Pyloric caeca moderately numerous, large. Lateral line single.

This family, from the Indo-Pacific region, is closely allied to the *Kyphosidae*, but has the maxilla concealed and the gill-membranes united to the isthmus. Only two genera are found in South African waters, both of which are endemic, though ranging as far as Madagascar.

Key to the South African genera.

1. Dorsal notched, with 10 spines . . . . . *Dipterodon.*
2. Dorsal not notched, with 11 spines . . . . . *Pachymetopon.*

Gen. Dipterodon C. and V.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vii, p. 274.

1914. Pellegrin, Bull. Soc. Zool. Fr., vol. xxxix, p. 231.

Body deep ovate. Dorsal fin notched, with 10 spines. The anterior soft rays of dorsal and anal prolonged, forming lobes. Teeth in a single row, the front ones chisel-shaped, the lateral ones more pointed ; usually no inner rows, but occasionally a few small conical teeth are present, more or less concealed in fleshy pads. Opercle and whole of preopercle scaly.

A South African genus with one species, which extends to Madagascar.

Dipterodon capensis C. and V.

Galjoen.

1831. Cuvier and Valenciennes, *loc. cit.*, p. 276, pl. clxxxviii.

1861. Castelnau, Mem. Poiss. Afr., Austr., p. 34 (coloration).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 165 (colour variation).

1914. Pellegrin, *loc. cit.*, p. 231 (*multifasciatus*).

1914. Gilchrist, Mar. Biol. Rep., vol. ii, p. 90 (habits).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 358 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 86 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 233.

Depth $1\frac{3}{4}$–2 (or a little over 2 occasionally), length of head 3–$3\frac{1}{4}$, in length of body. Eye $3\frac{3}{4}$ (young)–5 (adult) in length of head, equal to or a little less than snout, $1\frac{1}{4}$ (young)–$1\frac{2}{3}$ (adult) in interorbital width. Maxilla reaching to, or almost to, below anterior margin of eye, its posterior end visible. Preopercle finely serrulate on hind margin and angle. Gill-rakers (12)14–15 on lower part of anterior arch. D X (17)18–23, 4th spine (or 4th and 5th) longest, 2–$2\frac{1}{2}$ in length of head. A III 13–15, 2nd and 3rd spines about equal. Longest anal rays usually slightly longer than longest dorsal rays, about $1\frac{1}{2}$ in length of head. Scales : l.l. 75–85 ; l.tr. ca. 30 above lateral line. Pyloric caeca 14. (Plate XXV, fig. 2.)

Length.—Up to 650 mm.

Colour.—Grey, lighter or darker, often strongly silvery, belly silvery white ; either uniform or with more or less distinct, dark, broad, vertical bands on the body, 5–6 in number, sometimes with intervening narrow bands (*multifasciatus*) ; fins greyish, soft dorsal and anal and ventrals blackish, anal and ventral spines white.

Locality.—Walfish Bay to Table Bay, False Bay to Natal coast, Delagoa Bay.

Distribution.—Madagascar.

Types of *capensis* and *multifasciatus* in Paris Museum.

The characters used by Pellegrin for differentiating *multifasciatus* are not constant; the 2nd and 3rd anal spines are about equal, decreasing proportionately to the size of the fish with age, and in four specimens, all from Natal, the dorsal rays range from 18–23. One of these has the typical alternate broad and narrow bands of *multifasciatus.*

The coloration, though usually uniform, is variable, as already noted by Castelnau and Gilchrist and Thompson, but the banded form is more typical of the warmer waters in the eastern part of our area. The contrast between the white spines of the anal and ventral fins and the black rays is usually well marked, especially in young fishes.

The Galjoen, so called either from its resemblance to the high-built galleons of old days, or its habit of following them (Gilchrist, Tr. S. Afr. Philos. Soc., vol. xi, p. 221, 1902), is found most commonly at the Cape, especially in False Bay, where it is one of the best known food-fishes. It is rare in Table Bay, and evidently prefers the warmer waters of the Mozambique and Agulhas currents. Its spawning habits and eggs are unknown.

Gen. Pachymetopon Gnthr.

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 424.

1914. Pellegrin, Bull. Soc. Zool. Fr., vol. xxxix, p. 264.

Body ovate. Dorsal fin not notched, with 11 spines. Anterior soft rays of dorsal and anal not forming lobes. Teeth consisting of a single row of incisors, with a band of smaller, conical ones behind them. Opercle scaly, but the margin of preopercle naked.

Two species, one from South Africa, the other from Madagascar, though possibly both are really the same fish.

**Pachymetopon grande* Gnthr.

1859. Günther, *loc. cit.*, p. 424 (the figure was not published).

1870. Steindachner, S.B. Ak. Wiss. Wien, vol. lx, p. 135 (*guentheri*).

1880. Günther, Study of Fishes, p. 406 (name only) (not Challenger Shore Fishes as given in Thompson, 1918).

1886. *Id.*, Ann. Mag. Nat. Hist., (5), vol. xviii, p. 367.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 86 (*grande* and *guentheri*).

Depth 3, length of head 5, in total length including caudal. Eye $4\frac{4}{5}$ in length of head, $1\frac{1}{2}$ in snout, about half the interorbital width. Maxilla reaching to below posterior nostril. Hind margin of preopercle minutely serrulate. D XI 11, 5th spine highest, $2\frac{1}{5}$ in length of head, soft rays nearly as high. A III 10, 2nd and 3rd spines about equal in length, 2nd the stronger, rays equal to those of dorsal. Scales: l.l. 70 (Steindachner)–80 (Günther counted above the l.l.); l.tr. $\frac{11\text{–}13}{22}$.

Length.—500 mm.

Colour (as preserved).—Uniform greyish, but Günther thinks it may have been red in life, with dorsal, anal, and ventral blackish.

Locality.—Cape seas.

Type of *grande* in British Museum.

I have not seen the type or any other specimen. Günther's remark (*loc. cit.*, 1886, p. 367) that Cape naturalists "would have no difficulty in obtaining other examples" has not come true. Neither the Cape Government Survey nor the Union Government Survey obtained a specimen.

Like Günther, both Steindachner and Pellegrin had only a single specimen. Thus three species have been instituted on three specimens. Günther considers *guentheri* to be the same as *grande*, and I cannot help thinking that Pellegrin's *gibbosum* is also the same. The scales in the lateral line and even transversely, both in this genus and in *Dipterodon*, are difficult to count accurately (Günther, *loc. cit.*, 1886, p. 368), and the difference between the prominence "across the forehead" (Günther) and the "gibbosité nuchale" (Pellegrin) may be only a verbal one, or if real may be due to difference in age or sex.

The distribution is not incompatible with there being only the one species, in view of the distribution of *Dipterodon capensis*.

P. gibbosum Pellegr. from Madagascar, measured 257 mm., and had D XI 12 and scales l.l. 63; l.tr. $\frac{8}{18}$.

Fam. 37. Lobotidae.

Agreeing with the *Lutianidae* (p. 646), but without subocular shelf, and without any teeth on the vomer or palatines. Maxilla concealed

throughout its length. Soft dorsal and anal lobate. Caudal rounded.

Three genera from warm seas. Meek and Hildebrand (Field Mus. Nat. Hist., zool. ser., vol. xv, p. 484, 1925) apparently do not admit the necessity of Jordan's genus *Verrugato* 1923 for the Pacific species *pacificus* Gilb.

Gen. Lobotes Cuv.

1829. Cuvier, Règne Anim., ed. 2, vol. ii, p. 177.

Snout very short. Mouth moderately protractile, the premaxillary shafts not very long, not reaching frontals. Teeth in villiform bands, with an outer row of larger conical teeth in front. Preopercle strongly serrate. Anal spines not very strong, graduated.

A single widely distributed species.

Lobotes surinamensis (Bl.).

Triple-tail.

1790. Bloch, Ichthyol., vol. vii, pl. ccxliii.

1878–88. Day, Fish. India, p. 84, pl. xxi, fig. 5.

1911. Jordan and Thompson, Proc. U.S. Nat. Mus., vol. xxxix, p. 436 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 324 (references).

Depth slightly over 2, length of head nearly 3, in length of body. Eye (according to age) 6–8¾ in length of head, 1–2 in snout, 1–2⅔ in interorbital width. Maxilla extending to below hind margin of eye. Preopercle with strong serrations, those at angle more or less spinate. Gill-rakers 13 on lower part of anterior arch. D XII 15. A III 11. Scales : l.l. 42–45 ; l.tr. $\frac{9\text{–}10}{16\text{–}18}$. (Plate XXVII, fig. 1.)

Length.—Up to 1000 mm.

Colour.—Slaty-grey, with bronzy or silvery sheen ; fins similarly coloured, except pectoral and margin of caudal, which are pale yellowish.

Locality.—Natal and Zululand coast.

Distribution.—All warm seas.

An excellent food-fish, but seldom caught in South African waters.

Fam. 38. Monodactylidae.

Body ovate or very deep, strongly compressed, with small or moderate ctenoid or cycloid scales. Mouth very oblique, protractile. Maxilla exposed posteriorly, without supplemental bone. Subocular shelf present or absent. Teeth villiform in jaws and on vomer, palatines, and tongue. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. The single dorsal and the anal long, the former with 5–8, the latter with 3 graduated spines, both covered with scales. Ventrals thoracic, of a spine and 5 rays, small or vestigial or absent, with or without axillary process. Caudal forked. Air-bladder present. Pyloric caeca numerous. Lateral line single.

A small family of small fishes comprised in two genera, one of which extends from the shores of South and East Africa to Southern Asia and Australia, while the second, *Schuettea* Steind. 1866 (syn. *Bramichthys* Waite 1905), is exclusively from Australia.

Regan maintains the genus *Psettus* as distinct from *Monodactylus* on account of its abnormally deep body, the presence of a subocular shelf, and the ankylosis of the pelvic bones.

Gen. Monodactylus Lac.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 131.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vii, p. 240 (*Psettus*).

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 44 (*Stromatoidea*).

1915. Boulenger, F.W. Fish. Afr., vol. iii, p. 119 (*Psettus*).

Scales small, ctenoid. Body ovate or very deep. Ventrals either small but normally developed, or reduced with 2–4 rays.

The species of this genus are often found in estuaries and in rivers several miles from the sea.

Key to the South African species.

1. Body ovate. V I 5. Gill-rakers 20–24 . . . . *falciformis.*
2. Body subcircular. V I 2–4. Gill-rakers 17–19 . . . . *argenteus.*

Monodactylus falciformis Lac.

1801. Lacépède, Hist. Nat. Poiss., vol. ii, pl. 5, fig. 4; and 1802, *ibid.*, vol. iii, p. 132.

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 44 (*Stromatoidea layardi*).

1915. Boulenger, F.W. Fish. Afr., vol. iii, p. 120, fig. 89.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 366 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 96 (references).

Body ovate. Depth $1\frac{1}{2}$ (adult)–2 (young), length of head $2\frac{2}{3}$–$3\frac{1}{3}$, in length of body. Eye 2–$2\frac{1}{2}$ in length of head, about twice snout, and $1\frac{1}{4}$–$1\frac{1}{3}$ times interorbital width. Gill-rakers 20–24 on lower part of anterior arch. D VIII 27–30. A III 27–30. Anterior rays of dorsal and anal forming obtuse lobes. V I 5, small but well developed. Scales : l.l. 50-60.

Length.—Up to 200 mm.

Colour.—Silvery, brownish above, lobes of the dorsal and anal fins blackish ; young with 7–10 dark vertical cross-bands, the broadest across the caudal peduncle, and a dark border to the dorsal and anal fins.

Locality.—Algoa Bay to Natal and Zululand, Delagoa Bay, entering rivers.

Distribution.—East coast of Africa, Indian seas, to China and Polynesia.

Monodactylus argenteus (Linn.).

1758. Linné, Syst. Nat., ed. 10 ; and 1766, *ibid.*, ed. 12, p. 461.

1915. Boulenger, F.W. Fish. Afr., vol. iii, p. 121, fig. 90.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 365 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 95 (references).

Body subcircular. Depth $1\frac{1}{4}$–$1\frac{1}{2}$, length of head 3–$3\frac{2}{3}$, in length of body. Eye $2\frac{1}{2}$–3 in length of head, twice the snout, and equal to or a little greater than interorbital width. Gill-rakers 17–19 on lower part of anterior arch. D VIII 28–30. A III 29–32. Anterior rays of dorsal and anal forming somewhat acute lobes. V I 2–4, very small. Scales : l.l. 50–60. (Plate XXVI, fig. 3.)

Length.—Up to 210 mm.

Colour.—Silvery, brownish above, lobes of dorsal and anal fins blackish ; young with two dark vertical bands, one through the eye, the other from nape through base of pectoral to between ventrals and anal.

Locality.—Knysna and Natal coast, entering rivers.

Distribution.—East coast of Africa, Indian seas, East Indies to Polynesia and Australia.

Distinguished from *falciformis* by the deeper body and in the young by the presence of only two cross-bands.

Fam. 39. Centropomidae.

(*Ambassidae.*)

Body oblong or elongate, with ctenoid or cycloid scales of variable size. Mouth moderately protractile. Maxilla broad, exposed, with or without supplementary bone. Teeth villiform, in bands in jaws and on vomer and palatines. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Preopercle often with a double ridge. Spinous and soft portions of dorsal fin separate or united, subequal, the former of 7–9 spines. Anal as long as, or a little shorter than soft dorsal, with 3 spines. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal forked. Lateral line single, extending on to caudal fin. Air-bladder present.

The genus *Ambassis* has usually been included in the family *Ambassidae*, but as Regan now groups the genera *Centropomus*, *Lates*, etc. with *Ambassis* in a single family, the family name is taken from the earliest genus.

Only one genus in South Africa.

Gen. Ambassis C and V.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 175.

Opercle without spine. Preopercle with double denticulated ridge. Preorbital usually denticulate. No supramaxilla. Dorsal fins connected, a recumbent forwardly directed spine in front of spinous dorsal, which has 7 spines, the 1st very short, 2nd strong. A basal sheath of scales along dorsals and anal. Scales cycloid, sometimes minute and deciduous. Canines sometimes present. Lateral line continuous, interrupted or partly obsolete.

Small coastal fishes of the Indo-Pacific region, often entering estuaries and rivers, some species exclusively fluviatile.

Key to the South African species.

1. Seven to nine median scales in front of dorsal fin.
   a. Inner ridge of preopercle serrate . . . . . *urotaenia.*
   b. Inner ridge of preopercle smooth, with only two spines at angle *natalensis.*
2. Eleven to fourteen median scales in front of dorsal fin.
   a. Lateral line continuous . . . . . *commersoni.*
   b. Lateral line interrupted . . . . . *gymnocephalus.*

**Ambassis urotaenia* Blkr.

1852. Bleeker, Nat. Tyds. Ned. Ind., vol. iii, p. 257.

1877. *Id.*, Atl. Ichthyol., vol. viii, p. 135, pl. cccxliv, fig. 2 ; pl. cccli, fig. 1.

1878–88. Day, Fish. India, p. 55, pl. xv, fig. 8.

1913. Weber, Siboga Exp. Monogr., 57, p. 216.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 130 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 339 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 220.

Depth $2\frac{1}{2}$–$2\frac{3}{4}$, length of head $2\frac{1}{2}$, in length of body. Eye $2\frac{1}{2}$ in length of head, twice length of snout. Teeth on tongue, no canines. Preorbital serrate. Preopercle with both edges serrate. Interopercle smooth. Gill-rakers 21 on lower part of anterior arch. D I . VII . I 9–10. A III 9–10. Scales : l.l. 27-28 ; l.tr. $\frac{2\text{–}3}{9}$ (not including fin sheaths). One (Day) or two (Bleeker) rows on cheek ; 7–8 in front of dorsal fin. Lateral line more or less interrupted. (Plate XXIV, fig. 4.)

Length.—Up to 90 mm.

Colour.—Translucent yellow, with a bright silver longitudinal band from eye to caudal ; fins yellowish, tip of spinous dorsal and a longitudinal band on each lobe of caudal blackish.

Locality.—Natal coast, Delagoa Bay, entering rivers.

Distribution.—Indian seas and East Indies.

Ambassis natalensis G. and T.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 148.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 339.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 220 (*ambassis* ? non Lacép.).

Depth $2\frac{3}{4}$–3, length of head 3, in length of body. Eye 3 in length

of head, snout $\frac{2}{3}$–$\frac{4}{5}$ eye. Teeth on tongue; no canines. Preorbital serrate. Preopercle with outer edge denticulate, inner ridge smooth except for 2 spines at angle. Interopercle smooth. Gill-rakers 20–22 on lower part of anterior arch. D I . VII . I 10. A III 10. Scales: l.l. 27–28; l.tr. $\frac{2}{8}$; 2 rows on cheek; 9(–10) in front of dorsal. Lateral line continuous.

Length.—Up to 65 mm.

Colour.—Yellowish (as preserved), without silver lateral band, but with a narrow, dark, longitudinal streak on hinder part of body to base of caudal fin; tip of spinous dorsal and membrane between 2nd and 3rd spines blackish.

Locality.—Natal coast, entering rivers.

Type in South African Museum.

The above is an emended description, the original description being erroneous in one or two points, notably the number of scales above the lateral line.

Fowler considers this as the same as *A. ambassis* Lacép., and possibly the earlier *safgha* Forsk.

Ambassis commersoni C. and V.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 176 pl. xxv.

1877. Bleeker, Atl. Ichthyol., vol. viii, p. 136, pl. ccclii, fig. 1.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 113, pl. xli, A, fig. 6.

1915. Boulenger, Freshwater Fish. Afr., vol. iii, p. 112, fig. 85.

1922. Norman, Ann. Mag. Nat. Hist, (9), vol. ix, p. 321.

Depth $2\frac{1}{2}$–$2\frac{3}{4}$, length of head $2\frac{4}{5}$–3, in length of body. Eye $2\frac{1}{2}$ (young)–$3\frac{1}{3}$ in length of head, as long as or greater than snout. Teeth on tongue; no canines. Preorbital serrate. Preopercle with both edges serrate. Interopercle smooth, or with 1–2 serrations. Gill-rakers 17–19 on lower part of anterior arch. D I . VII . I 10. A III 10. Scales: l.l. 28–29; l.tr. $\frac{3}{9}$; 2 rows on cheek; 12–13 in front of dorsal. Lateral line continuous.

Length.—Up to 150 mm.

Colour.—Yellowish, with bright silver band from eye to caudal; membrane between 2nd and 3rd dorsal spines blackish.

Locality.—Natal coast.

Distribution.—Indian seas, East Indies.

The figure given by Cuvier and Valenciennes, and copied by Boulenger, shows a deep suborbital with 5 rows of scales, which is in conflict with Boulenger's description. If the figure is correct then *commersoni*, of Boulenger and Sauvage, is an entirely different fish. The South African Museum specimen agrees with Boulenger's description.

Fischer's *Apogon roseus* (1885, Jahrb. Hamb. Wiss. Aust., vol. ii, p. 66) from Mozambique is too inadequately described for specific determination, though it is clearly an *Ambassis*, and may very probably be this species.

**Ambassis gymnocephalus* (Lac.).

1802. Lacépède, Hist. Nat. Poiss., vol. iii, pl. xxiii, fig. 3 ; vol. iv, p. 216.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 181 ; vol. vi, p. 503 ; vol. ix, p. 431 (*dussumieri*).

1877. Bleeker, Atl. Ichthyol., vol. viii, p. 138, pl. ccclii, fig. 3 (synonymy).

1878–88. Day, Fish. India, p. 54, pl. xv, fig. 6.

1913. Weber, Siboga Exp. Monogr., 57, p. 217.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321 (*dussumieri*).

Depth $2\frac{3}{4}$–$2\frac{4}{5}$, length of head 3, in length of body. Eye 3 in length of head, greater than snout. Teeth on tongue ; no canines. Preorbital serrate. Preopercle with both edges serrate. Interopercle smooth. D I . VII . I 9–10. A III 9–10. Scales : l.l. 27–29 ; l.tr. $\frac{2}{9\text{–}10}$; 2 rows on cheek, 14 in front of dorsal. Lateral line interrupted.

Length.—Up to 100 mm.

Colour.—Yellowish, with a bright silver band from eye to caudal ; fins yellowish ; membrane between 2nd and 3rd dorsal spines blackish.

Locality.—Natal coast.

Distribution.—Indian seas and East Indies.

Fam. 40. Kyphosidae.

Rudder-fishes.

Body oblong-ovate, compressed, with small ctenoid scales. Mouth small, moderately protractile. Maxilla exposed, without supple-

mental bone. No subocular shelf. Jaws with an outer series of strong incisors, implanted with more or less conspicuous roots, with a narrow band of villiform teeth behind them; villiform teeth on vomer, palatines, and usually tongue. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. A single dorsal fin. Anal spines 3. Soft dorsal and anal scaly. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal forked. Air-bladder present. Pyloric caeca numerous. Lateral line single.

Small fishes, of no great value as food-fishes, found in all tropical seas. Herbivorous, feeding on seaweeds and algae.

These fishes obtain their name of Rudder-fishes from their habit of following ships.

Gen. Kyphosus Lacép.

1802. Lacépéde, Hist. Nat. Poiss., vol. iii, p. 114.

1803, *Id.*, *ibid.*, vol. iv, p. 429 (*Pimelepterus*).

1912. Jordan and Thompson, Proc. U.S. Nat. Mus., vol. xli, p. 594.

1920. McCulloch, Rec. Austr. Mus., vol. xiii, p. 56.

Top of head scaly. Preopercle feebly serrulate. Incisors strong, with conspicuous roots; teeth present on tongue. Gill-rakers long. Spinous and soft portions of dorsal about equal. Anal similar to, not higher than, soft dorsal. Caudal moderately forked. Junction of gill-membranes forming an angle. The skin covering the branchiostegals scaly.

Most of the species of this genus are found in the Indo-Pacific region.

Kyphosus fuscus Lacép.

Rudder-fish; Bastard Jacob Piver (Cape); *Blue-fish* (East London); *Butter-bream* (Natal).

1803. Lacépéde, Hist. Nat. Poiss., vol. v, p. 484.

1838. Rüppell, Neue Wirbelt. Fische, p. 34, pl. x, fig. 3.

1914. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xiii, p. 70 (*cinerascens* non Forsk.).

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 113 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 324, and p. 323 (*cinerascens* non Forsk. Only the 1914 reference).

1918. Regan, *ibid.*, vol. ii, p. 76.

Depth $2\frac{1}{5}$, length of head $3\frac{2}{3}$–$3\frac{3}{4}$, in length of body. Eye $3\frac{3}{4}$–$3\frac{4}{5}$ in length of head, $1\frac{1}{3}$ in interorbital width. Preorbital scaleless. Gill-rakers 20 on lower part of anterior arch. D XI 12–13(14), none of the soft rays as high as the highest spine. A III 11–13, anterior rays as long as the longest dorsal spine. Scales: l.l. 64–69; l.tr. $\frac{10\text{–}12}{19\text{–}22}$.

(Plate XXVII, fig. 2.)

Length.—Up to 700 mm.

Colour.—Brownish, paler and silvery below, head violaceous, a series of more or less distinct longitudinal stripes, which in preserved specimens are paler than the ground colour.

Locality.—False Bay to Natal and Zululand.

Distribution.—Red Sea, Indian seas, East Indies, to Hawaiian Islands.

Although frequent in Natal, this fish seems to be rare further westwards. According to Castelnau it feeds on molluscs, and its flesh is good eating.

The specimen identified by Gilchrist and Thompson as *cinerascens* is not that species, which is characterised by having the anterior soft dorsal rays higher than the spines.

The species of this genus are all very closely allied, and it is perhaps possible that *oblongior* C. and V. and *lembus* C. and V. will eventually be united with *fuscus*.

Fam. 41. Lutianidæ.

Body oblong or ovate, compressed, with moderate-sized, more or less strongly ctenoid scales. Mouth moderate or large, nearly horizontal, protractile. Maxilla long, typically without supplementary bone. Teeth villiform or conical, sometimes molariform, but never incisiform, on jaws, vomer and palatines, and usually also tongue; sometimes deciduous. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Dorsal fin single, more or less notched between spinous and soft portions, sometimes almost separated into two. Anal spines 3. Ventrals thoracic, of a spine and 5 rays, with axillary process (except in *Pristipomoides*). Caudal emarginate or forked. Lateral line single. Air-bladder present. Pyloric caeca few. A strong subocular shelf.

A large family chiefly inhabiting warm seas. All are good food-fishes, but few have any great economic importance.

Key to the South African genera.

1. Soft dorsal and anal scaleless (*Etelinae*).
   a. All teeth villiform. Pectoral short . . . . . *Apsilus.*
   b. Canines present in jaws. Pectoral falcate . . . *Pristipomoides.*
2. Soft dorsal and anal scaly (*Lutianinae*).
   a. No canine teeth . . . . . *Caesio.*
   b. Canine teeth present . . . . . *Lutianus.*

Gen. Apsilus C. and V.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 548.

1922. Jordan and Jordan, Mem. Carn. Mus., vol. x, p. 50 (key to genera of *Etelinae*).

All the teeth villiform, no canines, minute teeth on tongue. Preopercle entire. Caudal fin, but not the soft dorsal or anal, scaly. Dorsal not deeply notched, spines 10. Anal rays 8. Last dorsal and anal ray not produced. Pectoral short. No transverse groove between interorbital and occipital.

**Apsilus fuscus* C. and V.

1830. Cuvier and Valenciennes, *loc. cit.*, p. 549, pl. clxviii *bis*.

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 82.

1870. Klunzinger, Verh. Zool. Bot. Gesell. Wien, vol. xx, p. 705.

1917. Jordan and Starks, Ann. Carn. Mus., vol. xi, p. 450 (name only).

Depth 3, length of head $3\frac{3}{4}$, in length of body. Eye $4\frac{1}{2}$ in length of head, $1\frac{1}{2}$ in snout (in figure, $3\frac{1}{2}$ and 1 respectively). D X 10, 4th or 5th spine longest. A III 8. Caudal deeply forked. Scales : l.l. 65 ; l.tr. 20 ; 6 series of scales on cheek.

Length.—Up to 325 mm.

Colour.—Brown, lighter below, dorsal mottled with darker.

Locality.—Delagoa Bay.

Distribution.—Cape Verde (C. and V.), Red Sea, Réunion, Ceylon.

I have seen a specimen in the British Museum from Delagoa Bay ex coll. Gilchrist.

Gen. Pristipomoides Blkr.

1852. Bleeker, Nat. Tyds. Ned. Ind., vol. iii, p. 574.

1862. Gill, Proc. Ac. Nat. Sci. Philad., p. 237 (*Platyinius*).

1903. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxii, p. 182 (*Bowersia*).

1911. Jordan and Thompson, Proc. U.S. Nat. Mus., vol. xxxix, p. 459 (part).

1922. Jordan and Jordan, Mem. Carn. Mus., vol. x, pp. 48, 50.

Canines in jaws on outer side of villiform bands, villiform teeth on vomer and palatines; tongue smooth. Preopercle feebly dentate. Caudal fin, but not dorsal or anal, scaly. Dorsal not deeply notched, spines 10. Anal rays 8. Last dorsal and anal ray prolonged. Pectoral long, falcate. A transverse groove between interorbital and occipital.

An Indo-Pacific genus, extending to the West Indies, if *Platyinius* be considered synonymous.

Pristipomoides filamentosus (C. and V.).

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 508.

1833. Bennett, Proc. Zool. Soc., vol. i, p. 127 (*mitis*).

1870. Klunzinger, Verh. Zool Bot. Gesell. Wien, vol. xx, p. 703.

1879. Castelnau, Proc. Linn. Soc. N.S.W., vol. iii, p. 373 (*roseus*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 345 (references).

1917. McCulloch, Rec. Austr. Mus., vol. xi, p. 173, pl. xxx (*roseus*).

Depth about $3\frac{1}{2}$, length of head $3\frac{1}{2}$–4, in length of body. Eye $4\frac{3}{4}$–$4\frac{4}{5}$ in length of head, $1\frac{1}{3}$–$1\frac{1}{2}$ in snout and in interorbital width. Maxilla reaching to below anterior margin or anterior third of eye. Depth of preorbital $1\frac{1}{3}$ in eye (longitudinal diameter). Preopercle obscurely serrate at angle. Gill-rakers 14 on lower part of anterior arch. D X 11, 4th spine longest. A III 8. Caudal deeply forked. Scales: l.l. 61–62; l.tr. $\frac{6–7}{16}$; 7 rows on cheek.

Length.—Up to 750 mm.

Colour.—Pink or reddish above, silvery below, basal part of each scale bluish, small blue and yellow lines over head, preorbital, and snout; spinous dorsal bluish and yellowish at base, pinkish and yellowish towards margin, soft dorsal with two rows of orange spots, ventrals and anal white, pectoral pale yellow, caudal light pink. (Klunzinger and McCulloch).

Locality.—Natal coast.

Distribution.—Red Sea, islands of Indian Ocean, New South Wales.

The Natal fish agrees so well with McCulloch's description of *Aprion roseus*, that there is little doubt the two are identical. McCulloch does not mention teeth on the tongue, which is therefore presumed to be

smooth, bringing this fish within the genus *Pristipomoides*. On the other hand the palatine teeth are quite obsolete in the Natal fish.

P. violescens J. and E. (1903, Bull. U.S. Fish. Comm., vol. xxii, p. 183; and 1905, *ibid.*, vol. xxiii, p. 236, fig. 97) from Hawaii is exceedingly close to, if not identical with, this species, in spite of certain slight differences in the descriptions.

The axillary process of the ventrals is obsolete in the Natal fish, likewise in the figure of *violescens*, and McCulloch specifically mentions its absence in *roseus*.

Gen. Caesio Lacép.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 85.

1923. Nicholls, Amer. Mus. Nov., No. 94, p. 2 (*Clupeolabrus* =young).

1925. Chabanaud, Bull. Soc. Zool. Fr., vol. 50, p. 151.

Teeth in one or several rows in both jaws, without canines, sometimes minute teeth on vomer, none on palatines or tongue. Preopercle entire or minutely denticulate. Soft dorsal and anal scaly, caudal more or less so; sometimes spinous dorsal also scaly. Dorsal not deeply notched, spines (9)10–13, usually very slender. Anal rays 10–13. Last dorsal and anal ray not prolonged. Pectoral moderate or rather long. A row of crenulate scales from suprascapula to occiput, with a shorter row in front and parallel with it, above the posterior border of orbit.

Indian seas to the East Indies.

Key to the South African species.

1. Maxilla almost completely concealed below preorbital. A black spot in axil of pectoral . . . . . *axillaris.*
2. Maxilla not concealed. A golden band along side; a dark band along each caudal lobe . . . . . *coerulaureus.*

Caesio axillaris Blgr.

Windtoy.

1861. Castelnau, Mem. Poiss. Afr. Austr., pl. 31 (*Cantharus brama*).

1900. Boulenger, Mar. Invest. S. Afr., vol. i, p. 10, pl. i.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 83 (*apillaris* sic).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 22.

Depth $2\frac{1}{2}$–$2\frac{2}{3}$, length of head $3\frac{1}{3}$–$3\frac{2}{3}$, in length of body. Eye $3\frac{1}{2}$–4

in length of head, 1–1½ in interorbital width, equal to (young) or a little less than snout. Teeth in a single row; no vomerine teeth. Maxilla extending to below posterior nostril, almost completely concealed beneath the preorbital, the depth of which is a little over ½ (adult) diameter of eye. Gill-rakers 21–22 on lower part of anterior arch. D XI 12, spines strong, middle spines longest, spinous portion naked. A III 11, 3rd spine slightly longer than 2nd. Pectoral as long as head. Caudal crescentic. Scales: l.l. 64–65; l.tr. $\frac{10–11}{19–20}$.

Length.—Up to 320 mm.

Colour.—Silvery, bluish above, a black spot in axil of pectoral, snout brownish, fins rosy.

Locality.—Table Bay, False Bay, Agulhas Bank, to 43 fathoms.

Type in British Museum; cotype in South African Museum.

A rare fish, occasionally extending into Table Bay; according to Castelnau following or as a precursor of high winds. This may perhaps indicate the origin of the local name.

Boulenger (*loc. cit.*) states that *C. lunaris* C. and V. occurs at the Cape, but on what evidence does not appear. *C. lunaris* differs in having a scaly spinous dorsal, 2nd anal spine longer than 3rd, and black tips to the caudal lobes.

Caesio coerulaureus Lacép.

1802. Lacépède, Hist. Nat. Poiss, vol. iii, p. 86.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 434.

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 392.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 39, pl. cccxlvii, fig. 4.

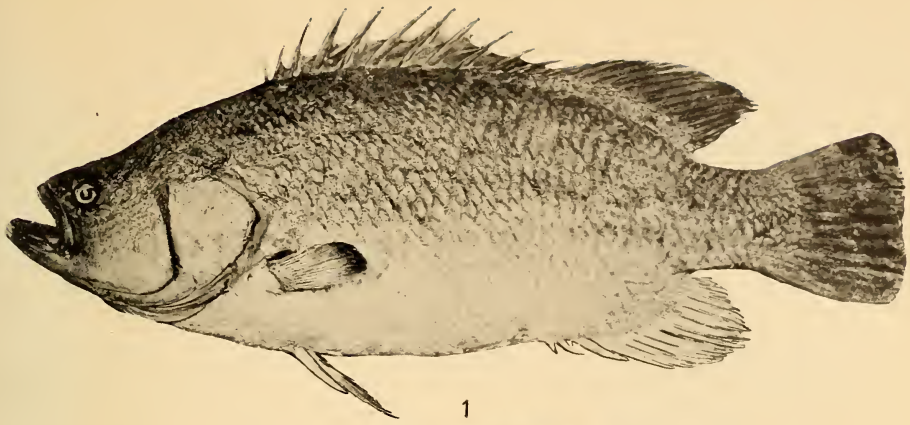
1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 170, pl. xvi, fig. 2.

1918. Regan, Ann. Durban Mus., vol. ii, p. 76.

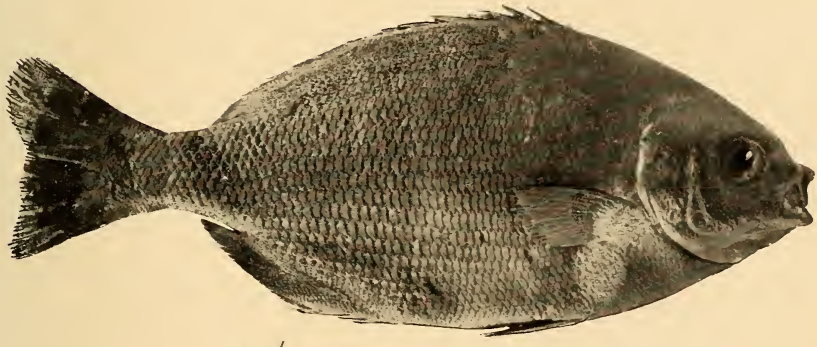
Depth 3⅕–3⅓, length of head 3–3¼, in length of body. Eye 3¾–4¼ in length of head, equal to or slightly less than snout, and also interorbital. Teeth in 1 or 2 rows; no vomerine teeth. Maxilla reaching to below anterior margin of eye, not concealed under the narrow preorbital, depth of which (opposite end of maxilla) is ⅓ diameter of eye. Gill-rakers 24–25 on lower part of anterior arch. D X 14–15, spines slender, spinous portion scaly. A III 12–13. Pectoral shorter than head. Caudal crescentic. Scales: l.l. 63–65; l.tr. $\frac{8}{17–18}$.

PLATE XXVII.

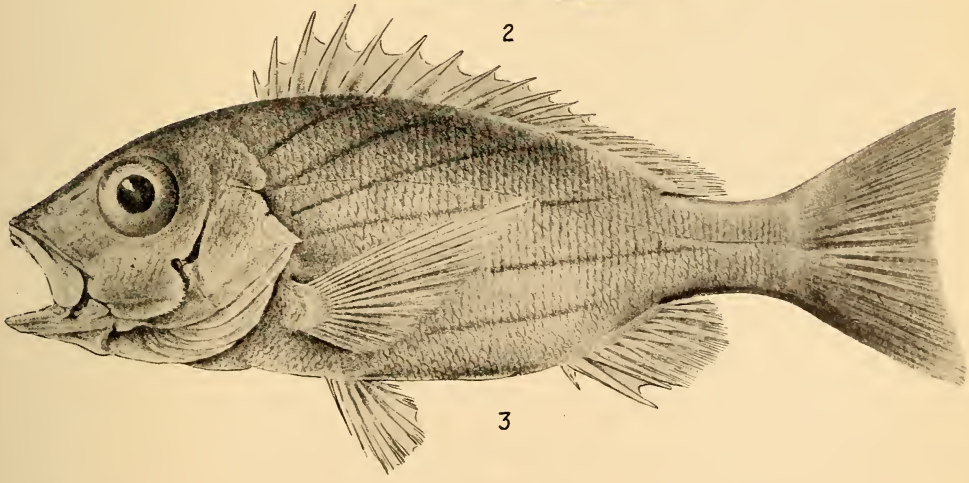
FIG.		TEXT-PAGE
1.	*Lobotes surinamensis* (Bl.) (original photo)	638
2.	*Kyphosus fuscus* Lac. (original photo)	645
3.	*Lutianus duodecimlineatus* (C. and V.) (after Sauvage)	653
4.	*Rhachycentrum canadus* (Linn.) (after Day)	511



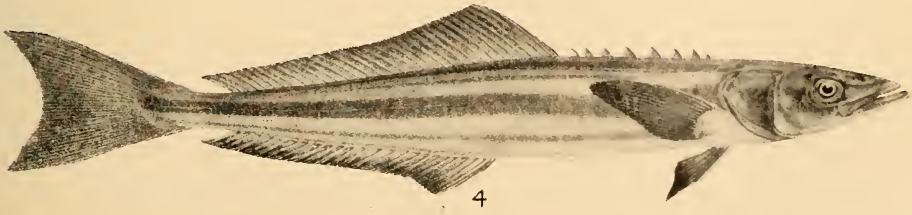
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2



3



4

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Length.—Up to 250 mm.

Colour.—Bluish, silvery below, with a broad, golden-yellow band from opercle to tail above the lateral line, fins rosy, ventrals white, caudal with a longitudinal dark bar along each lobe, pectoral with a black axillary spot.

Locality.—Natal coast.

Distribution.—Indian seas, East Indies.

The closely allied species *chrysozona* C. and V. appears to be constantly distinguished by the golden lateral band running below the lateral line, and the caudal lobes having black tips but no longitudinal bars.

Gen. Lutianus Bl.

Snappers.

1790. Bloch, Ichth., vol. iv, p. 107 (later spelling : *Lutjanus*).

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 410 (*Diacope* non Hübn. Lepidoptera).

1828. *Id.*, *ibid.*, p. 441 (*Mesoprion*).

1850. Cantor, Malay Fish., p. 12 (*Genyoroge*).

1911. Jordan and Thompson, Proc. U.S. Nat. Mus., vol. xxxix, p. 445 (synonymy).

Teeth in villiform bands in jaws, with usually an outer enlarged series, and 2–4 canines in front of upper jaw ; villiform teeth on vomer and palatines, and also one or more patches on tongue. Maxilla mostly concealed under preorbital. Preopercle finely serrate on hinder margin, entire or with a shallow or deep notch into which fits a more or less pronounced knob situate on the interopercle. Soft dorsal and anal scaly. Dorsal not deeply notched, spines 10–12, not slender. Anal rays 7–9. Last dorsal and anal ray not prolonged. Pectoral moderate. No transverse groove between interorbital and occipital. A row of crenulate scales from suprascapula to occiput, with a shorter row in front of it.

Tropical and subtropical seas. Species numerous, and mostly valued as food.

Key to the South African species.

I. Preopercle with deep notch receiving the strong interopercular knob. Vomerine teeth in a Λ-shaped band. No lingual teeth (*Genyoroge*).

A. Interorbital scaly. Dorsal profile not elevated.

1. Longitudinal blue bands rather broad . . . . *kasmira.*
2. Longitudinal blue bands narrow . . *duodecimlineatus.*

B. Interorbital scaleless. Dorsal profile elevated.
1. With broad black bands. D XI . . . . *sebae.*
2. Head with blue lines, body with blue speckling. D X . *rivulatus.*
3. Without black bands. D X.
a. Vertical fins with yellowish or whitish margins.
i. Scales: l.ser. below l.l. 65 . . . . *gibbus.*
ii. Scales: l.ser. below l.l. 46–48 . . *waigiensis.*
b. Vertical fins with black margins . . . *aurantiacus.*

II. Preopercle with shallow notch. Interopercular knob absent or very feeble (*Mesoprion*).
A. Scales above l.l. in oblique rows.
1. No lingual teeth. D XI . . . . . *erythropterus.*
2. With lingual teeth. D X.
a. Vomerine teeth in a ∧-shaped band or triangular patch. No black spot on side.
i. Scales in l.ser. 60. No silvery spots on side *lineatus.*
ii. Scales in l.ser. 52–54. Two silvery spots on side *bohar.*
b. Vomerine teeth in a patch with a median posterior projection. A black spot on side . . . . *fulviflamma.*
B. Scales above l.l. in rows parallel with dorsal profile.
1. Vomerine teeth in a ∧-shaped band or triangular patch. A black spot on side . . . . . *johni.*
2. Vomerine teeth with a median posterior projection. No black spot on side. . . . . *gembra.*

Lutianus kasmira (Forsk.).

Blue-banded Snapper.

1775. Forskal, Descr. Anim., p. 46.

1790. Bloch, Ichth., pl. ccxxxix (*quinquelineatus* or *quinquelinearis*), and pl. ccxlvi, fig. 2 (*bengalensis*).

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 55, pl. cccii, fig. 3; pl. cccxxxiii, fig. 4 (*bengalensis*).

1878–88. Day, Fish. India, p. 33, pl. x, fig. 4 (*bengalensis*).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 97, pl. xiii, fig. 1 (*bengalensis*).

1911. Jordan and Thompson, Proc. U.S. Nat. Mus., vol. xxxix, p. 446.

1913. Weber, Siboga Exp. Monogr., 57, p. 248 (remarks on synonymy).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 341 (*bengalensis*), and p. 345 (*quinquelinearis*) (references).

Depth $2\frac{1}{2}$–$2\frac{3}{4}$, length of head $2\frac{1}{3}$–$2\frac{1}{2}$, in length of body. Eye $3\frac{2}{3}$–$3\frac{4}{5}$ in length of head, a little less than snout, interorbital width $1\frac{1}{3}$ in eye. Vomerine teeth on a ∧-shaped band. Tongue smooth. Maxilla ex-

tending to below anterior third of eye. Preopercle deeply notched. Interopercular knob strong. Preorbital depth $\frac{2}{3}$ vertical diameter of eye. Gill-rakers 13–14 on lower part of anterior arch (the lower 4 rudimentary). D X–XI 14, 4th spine longest. A III 7–8. Scales : l.ser. 60–66 (below l.l.) ; 8–9 between spinous dorsal and l.l. ; 7 rows on cheek. Interorbital scaly. Scales above lateral line in oblique rows.

Length.—Up to 265 mm.

Colour.—Lemon-yellow, with 4 blue, black-edged bands on each side, the lowest running from snout under eye to caudal, the others running obliquely from behind eye to base of dorsal, often one or two additional blue bands on lower part of opercle and on belly, often a more or less distinct black spot between lateral line and anterior soft dorsal rays (this spot and the black edging to the blue bands more distinct in preserved than living specimens), fins yellow.

Locality.—Natal, Delagoa Bay, Mozambique.

Distribution.—Indian seas, East Indies, Japan, Australia.

The synonymy of this species, as of several others in the genus, is considerably involved. The dorsal spines appear to vary from 10–12. According to Bleeker and Day this species is characterised by having no pyloric caeca, but see Weber (*loc. cit. supra*). In one specimen I have observed two caeca.

The rather *wide* lateral bands, with their crenulate black margins, are eminently characteristic.

Lutianus duodecimlineatus (C. and V.).

Narrow-striped Snapper.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 529.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 96, pl. xiii, fig. 3.

1914. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xiii, p. 65 (*quinquelinearis* non Bloch).

Depth $2\frac{1}{2}$–$2\frac{2}{3}$, length of head $2\frac{2}{3}$, in length of body. Eye $3\frac{2}{3}$–$3\frac{3}{4}$ in length of head, slightly less than snout, slightly greater than interorbital width. Vomerine teeth in a ∧-shaped band. Tongue smooth. Maxilla extending to below anterior third of eye. Preopercle deeply notched. Interopercular knob strong. Preorbital depth $\frac{2}{3}$ vertical diameter of eye. Gill-rakers 12–13 on lower part of anterior arch (the lower 3 rudimentary). D XI 13–14, 4th spine longest. A III 8. Scales : l.ser. (below l.l.) 52–56 ; 9–10 between spinous dorsal and

l.l. ; 7–8 rows on cheek. Interorbital scaly. Scales above lateral line in oblique rows. (Plate XXVII, fig. 3.)

Length.—Up to 300 mm.

Colour.—Orange-yellow, with 6 narrow lilac or blue streaks, all of which begin behind opercle, the two lower ones horizontal, the others running obliquely upwards to base of dorsal fin ; a more or less distinct dark spot between lateral line and anterior soft dorsal rays.

Locality.—Natal coast.

Distribution.—Madagascar region.

Distinguished from *kasmira* by the *narrow* blue streaks on the sides ; the 3rd and 4th streaks, which run above and below the dark patch, arise from a short common base immediately behind the opercle at a level between the two flat opercular spines.

**Lutianus sebae* (C. and V.).

Seba's Snapper.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 411.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 62, pl. cccl, fig. 2.

1878–88. Day, Fish. India., p. 30, pl. ix, fig. 3.

Dorsal profile elevated. Depth $2\frac{1}{5}$–$2\frac{1}{3}$, length of head $2\frac{1}{2}$–$2\frac{2}{3}$, in length of body. Eye $3\frac{1}{2}$–4 in length of head, $1\frac{1}{3}$ in snout, greater than interorbital width. Vomerine teeth in a ∧-shaped band. Tongue smooth. Maxilla extending to below anterior third or centre of eye. Preopercle deeply notched. Interopercular knob strong. Preorbital depth equal to or slightly greater than long diameter of eye. D XI 15–16, 3rd spine longest. A III 9–11. Middle rays of soft dorsal and anal elevated into a point. Scales : l.ser. (below l.l.) 58–60 ; 8–9 between spinous dorsal and l.l. ; 6 rows on cheek. Interorbital scaleless. Scales above lateral line in oblique rows.

Length.—Up to 900 mm.

Colour.—Reddish, each scale with a light spot, with 3 broad black bands, first from origin of dorsal through eye to snout, second from spinous dorsal to ventrals, third from soft dorsal, curving downwards to lower half of caudal ; ventrals, lower half of anal, and tips of caudal black.

Locality.—Mozambique coast.

Distribution.—Indian seas to East Indies, N. and E. Australia.

**Lutianus rivulatus* (C. and V.).

Blue-speckled Snapper.

1828. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ii, p. 414, pl. xxxviii.

1828. *Id., ibid.*, pp. 424, 445 (*coeruleopunctatus* and *alboguttatus*).

1877. Bleeker, Atl. Ichth., vol. viii, p. 73, pl. cccxlvii, fig. 3.

1878–88. Day, Fish. India, p. 37, pl. xi, fig. 4.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 104.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 228.

Dorsal profile elevated. Depth $2\frac{1}{6}$–$2\frac{1}{8}$, length of head $2\frac{1}{3}$–$2\frac{2}{3}$, in length of body. Eye $4\frac{1}{2}$–6 in length of head, $1\frac{1}{2}$–$2\frac{1}{3}$ in snout. Vomerine teeth in a triangular patch or ∧-shaped band. Tongue smooth. Maxilla extending to below anterior margin of eye. Preopercle deeply notched. Interopercular knob well developed. Preorbital depth equal to or a little greater than long diameter of eye. D X 15–16, 3rd–5th spines longest. A III 8–9. Scales : l.ser. (below l.l.) 50–54 ; 8–9 between spinous dorsal and l.l. ; 6–7 rows on cheek. Interorbital scaleless. Scales above lateral line in oblique rows.

Length.—Up to 450 mm.

Colour.—Olivaceous or reddish, with indistinct dusky vertical bars (6–7) across upper half, each scale with a small white or bluish spot ; a silvery spot on lateral line below anterior dorsal rays ; head with numerous longitudinal wavy bluish lines ; fins rosy or yellowish, or dorsal slaty with whitish margin, and ventrals dusky.

Locality.—Natal coast.

Distribution.—East coast of Africa, Indian seas, and East Indies to Japan.

Closely allied to the preceding species.

**Lutianus gibbus* (Forsk.).

Gibbous Snapper.

1775. Forskal, Descr. Anim., p. 46.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 59, pl. cccxv, fig. 3 (*butonensis* or *bottonensis*).

1878–88. Day, Fish. India, p. 43, pl. xiii, figs. 2, 3.

Dorsal profile elevated. Depth of body about equal to length of head, $2\frac{1}{2}$–$2\frac{2}{3}$ in length of body. Eye $3\frac{1}{3}$ (young)–$4\frac{1}{4}$ (adult) in length of head, 1–$1\frac{1}{2}$ in snout, equal to interorbital width. Vomerine teeth

in a Λ-shaped band. Tongue smooth. Maxilla extending to below anterior margin of eye. Preopercle deeply notched. Interopercular knob strong. Preorbital depth equal to long diameter of eye (adult). D X 14–15, 3rd–5th spines longest. A III 8–9. Scales : l.ser. (below l.l.) 65 ; 7–8 between spinous dorsal and l.l. ; 5–6 rows on cheek. Interorbital scaleless. Scales above lateral line in oblique rows.

Length.—Up to 400 mm.

Colour.—Crimson ; soft dorsal, anal, and caudal with white or yellow margins ; pectoral and ventral yellowish, latter with dark tip.

Locality.—Mozambique coast.

Distribution.—Indian seas to East Indies.

Lutianus waigiensis (Q. and G.).

Yellow-margined Snapper.

1824. Quoy and Gaimard, Voy. Uranie, p. 307.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 69, pl. cccxlix, fig. 2 (*marginatus*).

1878–88. Day, Fish. India, p. 44, pl. xiii, fig. 5 (*marginatus*).

1911. Jordan and Thompson, Proc. U.S. Nat. Mus., vol. xxxix, p. 457, fig. 4.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 344 (*marginatus*).

Dorsal profile elevated. Depth of body about equal to length of head, $2\frac{1}{2}$–$2\frac{3}{4}$ in length of body. Eye $3\frac{1}{2}$–4 in length of head, $1\frac{1}{5}$–$1\frac{1}{2}$ in snout, greater than interorbital width. Vomerine teeth in a Λ-shaped band. Tongue smooth. Maxilla extending to below anterior third or centre of eye. Preopercle deeply notched. Interopercular knob strong. Preorbital depth $\frac{3}{4}$ vertical diameter of eye. D X 13–14, 4th spine longest. A III 8–9. Scales : l.ser. (below l.l.) 46–48 ; 7–8 between spinous dorsal and l.l. ; 6–7 rows on cheek. Interorbital scaleless. Scales above lateral line in oblique rows.

Length.—Up to 400 mm.

Colour.—Reddish or purplish, each scale with a yellow spot forming oblique streaks above lateral line, horizontal ones below, with or without a dark lateral spot ; soft dorsal, anal, and caudal with yellow margins ; submarginal area deep violet or black ; pectoral and ventral yellowish.

Locality.—Natal and Mozambique coasts.

Distribution.—Indian seas, East Indies, to Japan.

This species is very similar in coloration to *gibbus*, but is distinguished by the larger scales and narrower preorbital.

**Lutianus aurantiacus* C. and V.

Black-margined Snapper.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 534 (*analis* non C. and V., *ibid.*, vol. ii, p. 452, 1828. West Indies).

1830. *Id.*, *ibid.*, p. 535 (*aurantiaca*).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 103, pl. xiii, fig. 2 (*analis*).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321 (*analis*).

Dorsal profile elevated. Depth $2\frac{1}{3}$, length of head $2\frac{2}{3}$, in length of body Eye 4 in length of head, $1\frac{1}{2}$ in snout Vomerine teeth in a ∧-shaped band. Tongue smooth. Maxilla reaching to below anterior margin of eye. Preopercle deeply notched. Interopercular knob strong. Preorbital depth equal to vertical diameter of eye. D X 14, 3rd and 4th spines longest. A III 8. Scales: l.l. 65 (Sauvage). Interorbital scaleless. Scales above lateral line in oblique rows.

Length.—Up to 200 mm.

Colour.—Greenish, with golden-brown bands along sides, dorsal with black margin, caudal brownish, pectoral pale, ventrals and anal yellowish.

Locality.—Natal coast.

Distribution.—Madagascar region, Southern Pacific.

Weber (1913, Siboga Exp. Monogr., 57, p. 252) refers this species and *flavipes* C. and V. with doubt to *marginatus* (=*waigiensis*). It may be synonymous with *flavipes*, but scarcely with *marginatus*. Sauvage, who has presumably compared the types, does not admit the identity with *flavipes*. In any case the name *analis* C. and V. 1830 is already preoccupied by *analis* C. and V. 1828, and must give place to *aurantiacus* C. and V.

Lutianus erythropterus (Bl.).

Ruby Snapper.

1790. Bloch, Ichth., vol. vii, p. 93, pl. ccxlix.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 58, pl. ccci, fig. 1 (*chirtah*) (not *erythropterus* Blkr.).

1878–88. Day, Fish. India, pp. 32, 746, pl. x, figs. 1, 2.

1911. Jordan and Thompson, Proc. U.S. Nat. Mus., vol. xxxix, p. 453 (synonymy).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 342 (references).

Dorsal profile elevated. Depth 2–2⅗, length of head 2⅖–3, in length of body. Eye 3–5 in length of head, 1⅓–1⅔ in snout, equal to or slightly greater than interorbital width. Vomerine teeth in a ∧-shaped band. No teeth on tongue. Maxilla reaching to below anterior margin of eye. Preopercle shallowly excavate. No interopercular knob. Preorbital depth equal to or 1⅓ times (adult) long diameter of eye. Gill-rakers 8–9 plus 3–4 rudiments on lower part of anterior arch. D XI 13–15, 3rd spine longest. A III 9–10. Scales: l.ser. (below l.l.) 63–70; 9–10 between spinous dorsal and lateral line; 6–7 rows on cheek. Interorbital scaleless. Scales above lateral line in oblique rows.

Length.—Up to 450 mm.

Colour.—Reddish, lighter below; a broad blackish band from origin of dorsal to eye; a black transverse band margined with white or pink on caudal peduncle; dorsal with blackish base and margin; ventrals partly or wholly black; pectoral and caudal pinkish, latter with narrow black margin; young with several longitudinal blackish lines along sides, becoming obsolete in adult.

Locality.—Natal coast.

Distribution.—Indian seas, East Indies, (Japan ?).

Lutianus lineatus (Q. and G.).

Yellow-streaked Snapper.

1824. Quoy and Gaimard, Voy. Uranie, p. 309.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 69, pl. cccix, fig. 4.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 101.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 344 (references).

Dorsal profile rather elevated. Depth 2½–2¾, length of head 2¾–3, in length of body. Eye 3¼–4½ in length of head, 1⅓ in snout, 1–2 times in interorbital width. Vomerine teeth in a ∧-shaped band. Tongue with an oblong band of minute teeth in adult. Maxilla reaching to below centre of eye. Preopercle in adult slightly excavate above angle. No interopercular knob. Preorbital depth equal to vertical diameter of eye. D X 13–14, 4th and 5th spines longest.

A III 8–9. Scales : l.ser. (below l.l.) 60 ; 8–9 between spinous dorsal and l.l. ; 7 rows on cheek. Interorbital scaleless. Scales above lateral line in oblique rows.

Length.—Up to 600 mm.

Colour.—Salmon coloured, shading to yellowish below, purplish above, each scale with a yellowish spot forming oblique streaks above and horizontal streaks below lateral line, dorsal and caudal purplish especially towards margins, other fins yellowish.

Locality.—Natal coast.

Distribution.—East Indies.

In coloration and general appearance this species is close to *waigiensis* and *flavipes*, as Bleeker remarks, but is distinguished by the shallow preopercular notch, the lingual teeth, and number of scales.

Sauvage considers that *lineatus* as described and figured by Bleeker is not the same as *lineatus* Q. and G.

**Lutianus bohar* (Forsk.).

Two-spot Snapper.

1775. Forskal, Descr. Anim., p. 46.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 64, pl. cccxlviii, fig. 4.

1878–88. Day, Fish. India, p. 44, pl. xiii, fig. 4.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 341 (references).

Depth $2\frac{2}{5}$–$2\frac{3}{4}$, length of head $2\frac{1}{2}$–3, in length of body. Eye $3\frac{1}{2}$–$3\frac{2}{3}$ in length of head, $1\frac{1}{5}$–$1\frac{1}{3}$ in snout, equal to or greater than interorbital width. Vomerine teeth in a ∧-shaped band or triangular patch. Tongue with one or two patches of teeth. Maxilla reaching to below centre of eye. Preopercle with a shallow excavation. Interopercular knob, if present, feeble. Preorbital depth $\frac{1}{2}$–$\frac{2}{3}$ long diameter of eye. D X 14–15, 4th spine longest. A III 8–9. Scales : l.ser. (below l.l.) 52–54 ; 7–8 between spinous dorsal and lateral line ; 7–8 rows on cheek. Interorbital scaleless. Scales above lateral line in oblique rows.

Length.—Up to 250 mm.

Colour.—Brownish, with a reddish or purplish tinge, two silvery-white spots on back above lateral line, the one below end of spinous, the other below end of soft, dorsal ; dorsal, front part of ventrals and anal, and a longitudinal band along each caudal lobe blackish ; pectoral light.

Locality.—Natal and Mozambique coasts.

Distribution.—Indian seas, East Indies, S. Pacific.

Lutianus fulviflamma (Forsk.).

Johnny.

1775. Forskal, Descr. Anim., p. 45.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 65, pl. cccxliv, fig. 3.

1878–88. Day, Fish. India, pp. 41, 783, pl. xii, fig. 6.

1917. Regan, Ann. Durban Mus., vol. i, p. 459.

1921. Gilchrist, Tr. Roy. Soc. S. Afr., vol. x, p. 24 (*johni* non Bl.).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 228 (*johnii* non Bl.).

Depth $2\frac{3}{4}$–3, length of head $2\frac{3}{4}$–3, in length of body. Eye 3–4 in length of head, $1\frac{1}{5}$–$1\frac{1}{3}$ in snout, equal to or slightly greater than interorbital width. Vomerine teeth in an arrow-head or lozenge-shaped patch. A patch of teeth on tongue. Maxilla reaching to below anterior third of eye. Preopercle with shallow excavation. Interopercular knob absent. Preorbital depth slightly less than vertical diameter of eye. Gill-rakers 7–8 plus 3–4 rudiments on lower part of anterior arch. D X 13–14, 3rd–5th spines longest (2–$2\frac{1}{3}$ in depth of body). A III 8–9. Scales: l.ser. (below l.l.) 48–50; 5–6 between spinous dorsal and lateral line; 6 rows on cheek. Interorbital scaleless. Scales above lateral line in oblique rows.

Length.—Up to 300 mm.

Colour.—Yellowish or rosy, with golden streaks along each series of scales, those above lateral line oblique, those below horizontal, a black blotch on lateral line below anterior soft dorsal rays; fins yellowish, more or less suffused with pink.

Locality.—Natal, Delagoa Bay, Mozambique, Port Amelia.

Distribution.—Indian seas, East Indies, S. Pacific, Australia.

This species is evidently often confused with *johni*. It appears to be far commoner than *johni* in South African waters. The coloration and the oblique rows of scales above the lateral line constitute a ready means of distinguishing the two species.

The closely allied species *russelli* Blkr. has been recorded from Mozambique by Playfair and Günther (Fish. Zanzibar, p. vii, and also under *notata*, p. 15, 1866). It is distinguished by its lower dorsal spines ($2\frac{1}{4}$–3 in depth of body) and by having the greater part of the lateral blotch above instead of below the lateral line. It must be confessed that the characters supposed to separate these two species are not altogether constant, but see also McCulloch, 1915, "Endeavour" Sci. Rep., vol. iii, pt. 3, p. 142.

**Lutianus johni* (Bl.).

Black-spot Snapper.

1802. Bloch, Ichthyol., vol. ix, p. 97, pl. cccxviii.

1876. Bleeker, Atl. Ichth., vol. viii, p. 49, pl. cccxxxviii, fig. 3.

1878–88. Day, Fish. India, p. 42, pl. xiii, fig. 1.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 125 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 343 (references).

Depth $2\frac{1}{3}$–$2\frac{3}{4}$, length of head $2\frac{3}{4}$–3, in length of body. Eye $3\frac{1}{2}$–4 in length of head, $1\frac{1}{3}$ in snout, greater than interorbital width. Vomerine teeth in a Λ-shaped band or a triangular patch. A patch of teeth on tongue (at least in adult). Maxilla extending to below centre of eye. Preopercle with shallow excavation. No interopercular knob. Preorbital depth equal to vertical diameter of eye. D X 13–14, 4th and 5th spines longest. A III 8–9. Scales: l.ser. (below l.l.) 45; 6–7 between spinous dorsal and lateral line; 7–8 rows on cheek. Interorbital scaleless. Scales above lateral line in rows parallel with dorsal profile.

Length.—Up to 350 mm.

Colour.—Olivaceous, lighter below, scales above lateral line each with a dark centre, forming dark streaks parallel with dorsal profile, a black blotch on lateral line below anterior soft dorsal rays, fins greenish or yellowish.

Locality.—Natal coast.

Distribution.—Indian seas, East Indies, S. Pacific.

Günther's old record from "Cape seas" and Regan's record from Natal appear to constitute the only records of this species from South African waters. It has evidently been confused with *fulviflamma*, to which species should rightly belong the colloquial name of "Johnny."

Lutianus gembra (Bl.).

Rock Salmon.

1801. Bloch Schneider, Syst. Ichth., p. 236, pl. li.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 74, pl. cccxxiv, fig. 3; pl. cccxxxiii, fig. 1 (*argentimaculatus*).

1878–88. Day, Fish. India, p. 37, pl. xi, fig. 5 (*argentimaculatus*), and p. 45, pl. xiii, fig. 6 (*yapilli*).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 87.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 146 (*salmonoides*).

1913. Weber, Siboga Exp. Monogr., 57, p. 252 (*argentimaculatus*) (remarks on synonymy).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 343 (references), and p. 345 (*salmonoides*).

Dorsal profile rather elevated. Depth $2\frac{2}{5}$–$2\frac{4}{5}$, length of head $2\frac{1}{2}$–3, in length of body. Eye $3\frac{1}{4}$–$5\frac{1}{4}$ in length of head, $1\frac{1}{5}$ (young)–$1\frac{4}{5}$ in snout, greater than (young) or equal to (adult) interorbital width. Vomerine teeth in a triangular patch with a median posterior projection (arrow-head shaped). Tongue with one or two patches of teeth. Maxilla reaching to below anterior third or centre of eye. Preopercle with shallow excavation. No interopercular knob. Preorbital depth equal to, or slightly greater than, long diameter of eye. Gill-rakers 7–8 plus 2–3 rudiments on lower part of anterior arch. D X 13–15, 3rd, 4th, and 5th spines longest. A III 8–9. Scales : l.ser. (below l.l.) 41–44 ; 5–7 between spinous dorsal and lateral line ; 8 rows on cheek. Interorbital scaleless. Scales above lateral line in rows parallel with dorsal profile.

Length.—Up to 600 mm.

Colour.—Reddish, lighter below, purplish or brownish above ; young with 6–9 narrow, vertical silvery bars, which become obsolete in adult ; dorsal, caudal, and anal more or less margined with orange, front of ventrals and anal pale.

Locality.—East London, Natal coast.

Distribution.—Indian seas, East Indies.

Type of *salmonoides* in South African Museum.

A good sporting and table fish.

Fam. 42. Scorpididae.

Body ovate or ovate-oblong, compressed, with small or very small ctenoid scales. Mouth small or large, moderately protractile. Maxilla more or less exposed posteriorly, without supplemental bone. Subocular shelf present. Teeth villiform in bands in jaws, the outer row sometimes somewhat lanceolate ; vomer, palatines, and tongue usually with teeth. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. A single dorsal fin, with well-developed spinous portion. Anal spines 3. Soft dorsal and anal scaly. Ventrals thoracic, of a spine and 5 rays, with axillary

process. Caudal forked. Air-bladder present. Pyloric caeca numerous or in moderate number. Lateral line single.

A family whose headquarters are in the Australasian region ; there are two representatives in South Africa, and two in the Eastern Pacific (Juan Fernandez and California).

Key to the South African genera.

1. Mouth small . . . . . *Scorpis.*
2. Mouth large . . . . . *Parascorpis.*

Gen. Scorpis C. and V.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 503.
1917. McCulloch, Rec. Austr. Mus., vol. xi, p. 175.

Body oblong-ovate. Mouth small, terminal. The outer series of teeth in the jaws more or less enlarged ; minute teeth on vomer, palatines, and tongue. Preopercle serrated. Gill-rakers moderate. Dorsal spines 8–10, in a slight groove, increasing in length posteriorly ; soft portion longer than spinous portion, the anterior rays subfalcate, forming a more or less prominent lobe. Anal spines graduated, the soft rays similar to those of the dorsal. Caudal scaly.

Australia, Juan Fernandez, and South Africa.

Scorpis lithophilus G. and T.

Stone-fish.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 162.
1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 365.

Depth 2, length of head $3\frac{2}{3}$–4, in length of body. Eye 3–$3\frac{1}{2}$ in length of head, equal to snout, $1\frac{1}{2}$ in interorbital width. Snout obtuse. Maxilla reaching to below anterior quarter or third of eye. Whole head, except interorbital space, snout and chin, scaly. Gill-rakers 12 on lower part of anterior arch. D VIII 20. A III 23–24. Anterior rays of anal slightly longer than those of dorsal, equal to length of pectoral and $\frac{3}{4}$–$\frac{4}{5}$ length of head. Scales : l.l. 90–95. (Plate XXVIII, fig. 1.)

Length.—Up to 260 mm.

Colour.—Slate-grey, ventrals white (in preserved specimen grey), a small semicircular black spot on edge of opercle.

Locality.—Natal coast, among rocks.

Type in South African Museum.

Gen. Parascorpis Blkr.

1875. Bleeker, Arch. Néerl., vol. x, p. 380.

1895. Boulenger, Cat. Fish. Brit. Mus., ed. 2, vol. i, p. 145.

1899. *Id.*, Ann. S. Afr. Mus., vol. i, p. 379 (*Atyposoma*).

Body ovate. Mouth large. Lower jaw projecting. Villiform teeth in the jaws, the outer ones sometimes slightly larger, in old individuals all the teeth sometimes enlarged, granular, and the bands do not meet when the jaws are closed, but remain exsert and visible; teeth on vomer and palatines, if present, minute, deciduous; usually absent. Preopercle serrate on lower margin and angle. Opercle with a flat spine. Maxilla exposed. Gill-rakers numerous, long, slender, spinulose. Dorsal spines 11–12, in a very shallow groove, the middle ones highest. Soft dorsal a little longer, or a little shorter, than spinous portion. Anal similar to soft dorsal, the anterior rays not forming lobes. Second and 3rd anal spines about equal. Caudal scaly. Pyloric caeca very numerous.

South Africa.

Examination of a considerable series, including one identified by Boulenger himself as *P. typus*, shows that there is some little variation in some of the characters relied upon by Boulenger in distinguishing his genus *Atyposoma* from *Parascorpis*, and that the two are clearly synonymous. The type of *Atyposoma* is a badly stuffed specimen (too fat and consequently not deep enough in the body), which evidently misled Boulenger in several respects, especially as he states that at the time *Parascorpis* was not known to him except from Bleeker's description and figure.

Parascorpis typus Blkr.

Milk-fish; Melk-vis.

1875. Bleeker, *loc. cit.*, p. 381, pl. vii.

1899. Boulenger, *loc. cit.*, p. 379, pl. 9 (*Atyposoma gurneyi*).

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 127.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 325.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 94 (*Atyposoma gurneyi*).

Depth 2–$2\frac{1}{5}$, length of head $2\frac{3}{4}$–$2\frac{4}{5}$, in length of body. Eye 5–6 in length of head, $1\frac{1}{2}$–$1\frac{3}{4}$ in snout, $1\frac{1}{3}$–$1\frac{3}{4}$ in interorbital width. Maxilla extending to below centre or posterior third (sometimes hind margin) of eye. Depth of preorbital $\frac{3}{5}$–$\frac{3}{4}$ in eye-diameter, minutely serrulate

in young specimens. Preopercle more or less distinctly, but not always finely, serrate. Gill-rakers 36 on lower part of anterior arch. D XI–XII 15–17, longest spines $2\frac{1}{2}$–$3\frac{1}{2}$ in length of head. A III 13–15, 2nd and 3rd spines subequal. Scales : l.ser. (above l.l.) 130–150 ; l.tr. (above l.l.) 25–30 ; l.l. 55–70. Whole head, including snout, chin, and maxilla, soft dorsal (but not spinous dorsal), anal, and caudal scaly.

Length.—Up to 600 mm.

Colour.—Grey or slaty, darker above, silvery white below ; fins greyish, except ventrals, which are whitish.

Locality.—False Bay and Agulhas Bank to Algoa Bay, 30–40 fathoms. Also Kosi Bay, Zululand (Brit. Mus.).

Type of *Atyposoma gurneyi* in South African Museum.

As the feeble dentition and the long and numerous gill-rakers would lead one to suspect, this fish is a plankton-feeder, the stomach contents consisting of Euphausiacea and other minute Crustacea.

Fam. 43. Pempheridae.

1913. Ogilby, Mem. Queensl. Mus., vol. ii, p. 60.

In general characters closely resembling the *Monodactylidae* (p. 639), but the dorsal fin much shorter than the anal, and not scaly. Ventrals well developed, with axillary process. Air-bladder and pyloric caeca usually present (absent in *Leptobrama*). Body ovate, or (in *Leptobrama*) oblong. Scales ctenoid or cycloid.

Small fishes from the tropical and temperate seas of the Indo-Pacific and West Atlantic Oceans.

Key to the South African genera.

1. Scales ctenoid.
   - *a.* Dorsal spines 6, anal 3 . . . . . *Pempheris.*
   - *b.* Dorsal spines 5, anal 2 . . . . . *Parapempheris.*
2. Scales cycloid . . . . . *Liopempheris.*

Gen. Pempheris C. and V.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vii, p. 296.

1911. Snyder, Proc. U.S. Nat. Mus., vol. xl, p. 528 (*Catalufa*).

Scales ctenoid, adherent. Eye large, without adipose eyelid. Preorbital entire. Maxilla dilated posteriorly. Teeth in jaws in narrow bands, none on tongue. Preopercle with 1–3 flattened spines at angle. Anal originating behind base of dorsal, scaly, with more

than 30 soft rays. Gill-rakers numerous, long. Air-bladder and pyloric caeca well developed.

Indo-Pacific and West Atlantic.

There is considerable difference of opinion among various authors as to the synonymy of the species. The character of the scales is not mentioned by earlier authors, and it is only presumed that the three species included here in this genus have ctenoid scales.

Key to the South African species.

1. Scales in lateral line more than 50.
   a. Front of dorsal fin, margins of anal and caudal, and axil of pectoral blackish . . . . . *otaitensis.*
   b. Fins without black markings . . . . . *mangula.*
2. Scales in lateral line less than 50 . . . . . *schwenki.*

**Pempheris otaitensis* C. and V.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vii, p. 304, pl. cxci.

1877. Bleeker, Atl. Ichthyol., vol. ix, p. 8, pl. ccclxxxiii, fig. 1.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 286.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 320 (references, but ? not those of *oualensis*).

Depth $2\frac{1}{2}$, length of head $3\frac{1}{2}$, in length of body. Eye 2 in length of head. Outer premaxillary and mandibular teeth not larger than the others, and not projecting outwards. Vomerine teeth in an angular band. D VI 9–10. A III 39–40. Scales : l.l. 55–63.

Length.—Up to 181 mm.

Colour.—Brownish or fuscous, silvery white below ; fins yellowish, dorsal blackish in front, axil of pectoral blackish, margin of anal and caudal black.

Locality.—Natal coast.

Distribution.—Polynesia, East Indies, China.

**Pempheris mangula* C. and V.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss, vol. vii, p. 304, p. 306 (*nesogallica*), and p. 308 (*malabarica*).

1878–88. Day, Fish. India, p. 175, pl. xlii, fig. 3, and Suppl., p. 788 (*malabarica*).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 285.

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 227.

Depth $2\frac{2}{3}$, length of head $3\frac{3}{4}$, in length of body. Eye 2–$2\frac{1}{2}$ in length of head. Outer premaxillary and mandibular teeth not larger than the others; not projecting outwards. D VI 9. A III 40–46. Scales: l.l. 58–64.

Length.—Up to 150 mm.

Colour.—Fuscous, reddish or violaceous above, silvery white below; fins rosy, without black markings.

Locality.—Natal coast.

Distribution.—East coast of Africa, Indian seas.

**Pempheris schwenki* Blkr.

1855. Bleeker, Nat. Tyds. Ned. Ind., vol. viii, p. 314.

1877. *Id.*, Atl. Ichthyol., vol. ix, p. 8, pl. ccclxxxiii, fig. 3.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 320.

Depth $2\frac{1}{3}$, length of head 3, in length of body. Eye 2–$2\frac{1}{4}$ in length of head. Outer premaxillary and mandibular teeth not larger than the others, not projecting outwards. D VI 9–10. A III 36–37. Scales: l.l. 45.

Length.—Up to 120 mm.

Colour.—Fuscous, silvery white below; fins rosy, top of dorsal and margin of caudal blackish, base of anal blackish or violaceous.

Locality.—Natal coast.

Distribution.—East Indies.

Gen. Parapempheris von B.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 11.

Similar to *Pempheris*, but with 5 dorsal and 2 anal spines, anal rays less than 30, and preopercle not denticulate.

**Parapempheris argenteus* von B.

1923. Von Bonde, *loc. cit.*, p. 11, pl. ii, fig. 2.

Depth $2\frac{3}{4}$, length of head $2\frac{3}{5}$, in length of body. Eye 3 in length of head. Teeth in a single row in jaws and on vomer and palatines. Maxilla reaching to below centre of eye. D V 9. A II 23. Scales: l.l. 75.

Length.—Up to 70 mm.

Colour.—Silvery, yellowish posteriorly; snout and scales on nape with black spots; each lobe of caudal with a black blotch.

Locality.—Natal coast, 33 fathoms.

Type in coll. Govt. Marine Survey.

Gen. Liopempheris Ogilby.

1913. Ogilby, Mem. Queensl. Mus., vol. ii, pp. 62, 66.

Similar to *Pempheris*, but the scales are cycloid and more or less caducous.

Indian seas, East Indies, Australia.

Liopempheris russelli (Day).

1878–88. Day, Fish. India, p. 175, pl. xlii, fig. 2 (*molucca* non C. and V.), and Suppl., p. 788.

1908. Regan, Ann. Nat. Mus., vol. i, p. 245 (*molucca* non C. and V.).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 320 (*molucca* non C. and V. Not the references).

Depth 2, length of head 3, in length of body. Eye $2\frac{1}{2}$ in length of head. Gill-rakers 20 on lower part of anterior arch. D VI 9. A III 40–42. Scales : l.l. 55–57. (Plate XXXI, fig. 1.)

Length.—Up to 150 mm.

Colour.—Fuscous, with minute dark specks, silvery below ; fins orange or rosy, upper part of dorsal blackish, axil of pectoral usually dark, anterior part of anal and margin of caudal dusky.

Locality.—Natal coast.

Distribution.—Indian seas.

There is probably little justification for Day's change of name, but it may stand until a revision of the whole family has been undertaken.

Fam. 44. Plectorhynchidae.

(=*Pomadasidae*, *Pristipomatidae*.)

Body oblong, with moderate-sized, more or less ctenoid scales. Mouth moderate or large, horizontal, protractile. Maxilla without supplementary bone, slipping for nearly its entire length under the preorbital. No subocular shelf. Teeth villiform or conical, but not canine-like ; none on palatines or tongue, and usually none on vomer. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Dorsal fin single, often

deeply notched, or even divided into two ; spines 9–14, usually strong, depressible, in a sheath. Anal spines 3. Soft dorsal and anal more or less scaly. Ventrals thoracic, of a spine and 5 rays. With axillary process. Caudal more or less emarginate. Air-bladder present. Pyloric caeca few. Lateral line single.

A family of numerous carnivorous fishes from warm seas, most of them valuable as food-fishes.

The family name is often given as *Pristipomatidae* or *Haemulidae*. Strictly speaking, as *Plectorhynchus* is the oldest genus, the family name should be *Plectorhynchidae*.

Key to the South African genera.

1. No median pit or groove on chin.
   a. Suborbital unarmed . . . . . *Plectorhynchus*.
   b. Suborbital with strong spine and serrations . . . . *Scolopsis*.
2. A median pit or groove on chin . . . . . *Pomadasys*.

Scolopsis monogramma K. and v. H. is recorded from Mozambique by Playfair and Günther (1866, Fish. Zanz., p. viii), but on whose authority is not apparent. This genus, characterised by the strong spine and serrations below the eye, is certain to be discovered in Portuguese East African waters, and is therefore included in the above key.

Gen. Plectorhynchus Lacép.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 135.

1817. Oken, Isis., p. 1783 (*Diagramma*).

Chin with pores, but without central pit or groove behind symphysis. No barbels. Preopercle serrate. Preorbital without free hind margin, more or less scaly. Suborbital without spine or serrations. Dorsal spines 9–14 ; no procumbent spine in front. Soft dorsal and anal scaly at base. Anal rays 6–9.

Indo-Pacific, Mediterranean, W. Africa. A genus in which the species often vary considerably in coloration at different ages, and which consequently contains many nominal species.

Key to the South African species.

I. Profile more or less elevated.
   A. Second dorsal spine abruptly longer than 1st. D IX–X 21–23. Scales small (*Spilotichthys*) . . . . . *pictus*.

B. Dorsal spines graduated.
1. Dorsal spines not very strong.
a. D XII–XIII 18–21.
i. With white longitudinal bands . . . *lineatus.*
ii. Uniform or with orange spots (reticulate when preserved).
Natal . . . . . *griseus.*
iii. Uniform. Angola . . . . *mediterraneus.*
b. D XI 16–17 . . . . . *chubbi.*
2. Dorsal spines very strong (*Euelatichthys*) . . *crassispinus.*
II. Profile not elevated (*Diagrammella*) . . . . . *macrops.*

Plectorhynchus pictus (Thunb.).

1792. Thunberg, Kon. Vet. Ak. Handl., vol. xiii, p. 141, pl. v, fig. 1.

1828. Rüppell, Atl. Fische Roth. Meer., p. 126, pl. xxxii, fig. 2 (*punctatum* Cuv.).

1876. Bleeker, Atl. Ichth., vol. viii, p. 24, pl. cccxxix, fig. 4 (adult); pl. cccxxxiii, fig. 2 (juv.); and pl. ccc, fig. 1 (half-grown as *punctatus*).

1878–88. Day, Fish. India, p. 81, pl. xxi, fig. 3, and p. 83, pl. xxi, fig. 4 (*punctatum*).

1912. Jordan and Thompson, Proc. U.S. Nat. Mus., vol. xli, p. 546 (synonymy).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321 (*punctatum*).

Depth $2\frac{1}{2}$–3, length of head 3–$3\frac{2}{3}$, in length of body. Eye 3–$3\frac{2}{3}$ in length of head, equal to (young) or less than snout, greater than interorbital width. Maxilla reaching to below anterior margin of eye. Gill-rakers 11–13 on lower part of anterior arch. D IX–X 21–23, 2nd spine longest, more than twice 1st, and $\frac{2}{3}$–1 length of head. A III 6–7, 2nd and 3rd spines subequal. Caudal rounded in young, truncate or emarginate in adult. Scales strongly ctenoid: l.ser. (below l.l.) 85–95. Hinder portion of preorbital scaly.

Length.—Up to 390 mm.

Colour.—Young: white, with two broad black longitudinal bands, one along back, the other from eye to caudal, often subdivided by white streaks; spinous dorsal, margin of soft dorsal, anal, and ventrals blackish; caudal with black central longitudinal band, and an oblique black band above and below. In half-grown specimens the bands begin to be broken up into oval or roundish spots, and the adult is silvery-greyish, with more or less distinct spots over the body and fins.

Locality.—Natal coast, Delagoa Bay, Mozambique.

Distribution.—Indo-Pacific to Japan and Australia.

This species undergoes remarkable changes in coloration during growth, the adult appearing to be an entirely different fish from the young, unless a series of all ages is examined. The long 2nd dorsal spine and the small scales are characteristic.

**Plectorhynchus lineatus* (Linn.).

1758. Linné, Syst. Nat., ed. 10, vol. i, p. 293, and Mus. Fred., pl. xxxi, fig. 4, 1764.

1835. Rüppell, Neue Wirbelt. Fische, p. 125, pl. xxxi, fig. 2 (*albovittatus*).

1866. Playfair and Günther, Fish. Zanz., p. viii (*albovittatus*).

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xx, p. 736 (*albovittatus*).

1876. Bleeker, Atl. Ichth., vol. viii, p. 16, pl. cccxxix, fig. 2 (*albovittatus*) ; p. 19, pl. cccvi, fig. 4 (*lineatus*) ; and p. 19, pl. cccxvii, fig. 3 (*lessoni*).

1878–88. Day, Fish. India, p. 78, pl. xx, fig. 5 (references and synonymy).

1913. Weber, Siboga Exp. Monogr., 57, p. 278.

Depth $2\frac{2}{3}$–$2\frac{3}{4}$, length of head $3\frac{1}{5}$, in length of body. Eye $2\frac{3}{4}$–3 in length of head, less than snout. Maxilla reaching to below anterior margin of eye. D XII–XIII 18–20, spines graduated to 3rd or 4th. A III 6–8. Caudal subtruncate. Scales : l.ser. (below l.l.) 65. Hind portion of preorbital scaly.

Length.—Up to 360 mm.

Colour.—Brownish above, yellowish below, with 3–6 silvery-white longitudinal bands ; fins yellowish, soft dorsal, anal, and caudal with fuscous bands or spots, spinous dorsal in young usually unspotted.

Locality.—Mozambique (Playfair and Günther).

Distribution.—Indian seas, East Indies.

Weber (*loc. cit.*) does not admit *albovittatus* to the synonymy of *lineatus*.

Plectorhynchus griseus (C. and V.).

Greyskin.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 306.

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 334 (*reticulatus*).

1878–88. Day, Fish. India, p. 81, pl. xxi, fig. 2.

1887. Boulenger, Proc. Zool. Soc. Lond., p. 656 (*jayakari*).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 155 (*durbanensis*).

1916. McCulloch, Sci. Res. "Endeavour," vol. iv, pt. 4, p. 185, pl. liii (*reticulatus*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 355 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, pp. 228, 229 (*durbanensis*, *foetela*, and *reticulatus*).

Depth $2\frac{1}{4}$–$2\frac{3}{4}$, length of head 3–$3\frac{2}{5}$, in length of body. Eye $2\frac{2}{3}$ (young)–4(5) in length of head, 1–2 in snout. Maxilla reaching to below nostrils or anterior margin of eye. Gill-rakers 16–19 on lower part of anterior arch. D XII–XIII 18–21, spines graduated to 3rd, 4th, or 5th, which is $\frac{2}{5}$–$\frac{1}{2}$ length of head. A III 7–8. Caudal truncate or slightly emarginate. Scales : l.l. 58–65 ; l.tr. $\frac{10–13}{25–28}$. Hind portion of preorbital scaly. Minute scales intermixed with the ordinary scales on opercle and body (at least in adult).

Length.—Up to 450 mm.

Colour.—Uniform greyish, sometimes with lighter cross-bars, fins more or less blackish, especially upper half of pectoral and extremities of caudal, anal, and ventrals ; a distinct colour variety has in life numerous orange, round or oval, more or less connected spots and streaks on head, body, and vertical fins ; the opercle with orange horizontal streaks ; when preserved these spots and streaks fade to a light brown and the coloration corresponds with that given for *reticulatus*.

Locality.—Natal and Zululand coast, Delagoa Bay.

Distribution.—Indian seas, China, Australia. Sometimes enters estuaries and rivers.

Type of *durbanensis* in South African Museum.

The two main colour varieties occur together and are not due to differences of age. I have seen many young and adults of both in a fresh state from the nets at Delagoa Bay. The orange-spotted (or, after death, reticulate) variety, however, appears to be the more common. The specimen reported on by Gilchrist and Thompson in 1911 (Ann. S. Afr. Mus., vol. xi, p. 31) is reticulate, while the type of *durbanensis* is uniformly coloured. Günther's *reticulatus* should, it seems, be placed in the synonymy of this species.

**Plectorhynchus mediterraneus* (Guich.).

1850. Guichenot, Expl. Algér. Rept. Poiss., p. 45, pl. 3.
1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 321.
1912. Pellegrin, Bull. Soc. Zool. Fr., vol. xxxvii, p. 292.
1914. *Id.*, Ann. Inst. Ocean., vol. vi, p. 47.

Depth 3, length of head $3\frac{3}{4}$, in total length (including caudal). Eye 3 in length of head. D XII 17, spines graduated. A III 9. Caudal emarginate.

Colour.—Uniform greyish, fins blackish.

Locality.—Mossamedes.

Distribution.—Algeria, Morocco, Senegal, Canary Islands.

This fish, of which the above brief description is taken from Günther after Guichenot, is stated by Pellegrin to grow to a "considerable size," and is protected by law on the French coasts.

Plectorhynchus chubbi (Regan).

1919. Regan, Ann. Durban Mus., vol. ii, p. 199, text-fig. 2.

Depth $2\frac{1}{2}$–$2\frac{2}{3}$, length of head 3–$3\frac{1}{4}$, in length of body. Eye 3–$3\frac{1}{2}$ in length of head, subequal to snout, a little greater than interorbital width. Maxilla reaching to below nostrils. Gill-rakers 21–22 on lower part of anterior arch. D XI 15–17, spines graduated to 4th, 5th, and 6th, which are $\frac{2}{5}$ length of head. A III 7–8. Caudal truncate or slightly emarginate. Scales: l.l. 60–62; l.tr. 15–17 between spinous dorsal and l.l. Hinder portion of preorbital scaly.

Length.—Up to 150 mm.

Colour.—Uniform greyish; margin of spinous dorsal, a band along soft dorsal, and extremities of caudal, anal, and ventrals more or less blackish.

Locality.—Natal coast.

Type in British Museum.

This species is very like the uniformly coloured variety of *griseus*, but is distinguished by the fewer dorsal rays and greater number of gill-rakers.

Plectorhynchus crassispinus (Rüpp.).

1835. Rüppell, Neue Wirbelt. Fische, p. 125, pl. xxx, fig. 4.
1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 319 (*affinis*).
1876. Bleeker, Atl. Ichthyol., vol. viii, p. 15, pl. cccxlii, fig. 4.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 355 (references).

Depth 2–2$\frac{1}{6}$, length of head 2$\frac{2}{3}$–3, in length of body. Eye 3–4$\frac{1}{2}$ in length of head, less than snout, about equal to interorbital width. Maxilla reaching to below nostrils. Gill-rakers 18–19 on lower part of anterior arch. D XIII–XIV 15–18, spines very stout, graduated to 4th and 5th, which are $\frac{3}{5}$–$\frac{2}{3}$ length of head. A III 7–8, 2nd spine longer and much stronger than 3rd. Caudal rounded. Scales : l.l. 50–55 ; l.tr. $\frac{10–12}{17–20}$. Hind portion of preorbital scaleless.

Length.—Up to 600 mm.

Colour.—Uniform dark brown, fins blackish, caudal in young yellowish-white.

Locality.—Natal and Zululand coast.

Distribution.—Indian seas, East Indies, to N.W. Australia.

**Plectorhynchus macrops* (Pelleg.).

1912. Pellegrin, Bull. Soc. Zool. Fr., vol. xxxvii, p. 295.

1914. *Id.*, Ann. Inst. Ocean., vol. vi, p. 48, pl. ii, fig. 3.

1919. Fowler, Proc. U.S. Nat. Mus., vol. lvi, p. 210.

Dorsal profile not elevated. Depth about equal to length of head, about 3 in length of body. Eye 3 in length of head, greater than snout and than interorbital width. (Fowler : 3$\frac{4}{5}$–4 in head, equal to interorbital, less than snout.) Maxilla reaching to below anterior margin of eye. Gill-rakers 20–23 on lower part of anterior arch. D XIII 15–16, spines graduated to 6th or 7th, which is 2$\frac{2}{3}$–2$\frac{3}{4}$ in length of head. A III 7–8, 2nd spine stronger but not longer than 3rd. Caudal emarginate. Scales : l.l. 55–58 ; l.tr. $\frac{10–12}{18–22}$. Hind portion of preorbital scaly.

Length.—Up to 360 mm.

Colour.—Violet, shading to yellow-orange below, fins violaceous.

Locality.—Mossamedes.

Distribution.—Cape Verde Islands (Fowler).

Type in Paris Museum.

Gen Pomadasys Lacép.

1803. Lacépède, Hist. Nat. Poiss., vol. iv, p. 515.

1817. Oken, Isis (*Pristipoma*).

1917. Jordan and Hubbs, Ann. Carn. Mus., vol. xi, p. 464 (*Dacymba*).

Chin with pores and a central pit or groove behind symphysis. No barbels. Preopercle serrate. Preorbital without free hind margin. Suborbital without spine or serrations. Dorsal spines 11–14, no procumbent spine in front. Soft dorsal and anal scaleless, or with a few scales between the rays. Anal rays 7–12.

Temperate and tropical seas, sometimes entering estuaries and rivers. Many of the species emit grunting sounds by contractions of the air-bladder, whence their name of Grunter or Chor-chor.

Key to the South African species.

I. A black opercular spot.
  A. Maxilla not reaching to below anterior margin of eye. Spines not very strong.
    1. With longitudinal rows of dark spots.
      a. Dorsal rays 14; l.l. 57–59 . . . . . *operculare.*
      b. Dorsal rays 15–16; l.l. 59–68 . . . . *suillum.*
    2. Uniform . . . . . *bennetti.*
  B. Maxilla reaching to below anterior margin of eye. Spines very strong.
    1. With interrupted dark vertical bars . . . . *hasta.*
    2. Uniform . . . . . *guoraka.*

II. No black opercular spot.
  A. Dorsal profile not elevated.
    1. Six to eight series of scales above l.l.
      a. With dark cross-bars, often divided into squarish blotches *maculatum.*
      b. With numerous small dark spots . . . *multimaculatum.*
    2. With 12 scales above l.l. . . . . *striatum.*
  B. Dorsal profile elevated (*Anisotremus*) . . . . . *furcatum.*

Pomadasys operculare (Playf.).

Grunter.

1866. Playfair in Playfair and Günther, Fish. Zanz., p. 24, pl. 4, fig. 1.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 354 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 80 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 231.

Depth about 3, length of head $2\frac{3}{4}$–$2\frac{4}{5}$, in length of body. Eye $3\frac{1}{2}$ (young)–$4\frac{1}{2}$ in length of head, 1 (young)–$1\frac{1}{2}$ in snout, in young greater than, in adult less than, interorbital width. Snout pointed. Maxilla

reaching to below posterior nostril. Gill-rakers 15–(16) on lower part of anterior arch. D XI 14, 4th spine longest, 11th spine not, or scarcely, longer than 10th. A III 9, 2nd spine longer and much stronger than 3rd. Scales : l.l. 57–59 ; l.tr. $\frac{9}{18–20}$. Lateral line tubes simple.

Length.—Up to 380 mm.

Colour.—Silvery, a black blotch on opercle, and numerous round, black spots on sides ; a dark spot at base of each dorsal spine and ray ; margin of dorsal, caudal, and front half of anal blackish.

Locality.—East London, Natal and Zululand coast, Delagoa Bay.

Distribution.—East coast of Africa to India.

According to Thompson's list this fish has the colloquial names of Spotted Steenbras at Simonsbay and Tiger at Port Elizabeth, but I am not aware of any actual record of its occurrence west of East London, from which locality the South African Museum has specimens. These colloquial names should probably be applied to *bennetti*.

**Pomadasys suillum* (C. and V.).

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 482.
1869. Steindachner, SB. Ak. Wiss. Wien, vol. lx, p. 682, pl. v.
1918. Thompson, Mar. Biol. Rep., vol. iv, p. 81 (references).
1919. Fowler, Proc. U.S. Nat. Mus., vol. lvi, p. 282.
1923. Pellegrin, Poiss. eaux douces l'Afr., occ., p. 257.

Depth $2\frac{3}{5}$–$2\frac{7}{8}$, length of head $2\frac{3}{4}$–$2\frac{4}{5}$, in length of body. Eye $3\frac{1}{2}$–$4\frac{1}{5}$ in length of head, less than snout but greater than interorbital width. Maxilla reaching to below nostrils. Gill-rakers 16 on lower part of anterior arch. D XI–XII 15–16, 3rd or 4th spine longest. A III 8–10, 2nd spine slightly longer and much stronger than 3rd. Scales : l.l. 59–68 ; l.tr. $\frac{9}{15–17}$. Lateral line tubes simple.

Length.—Up to 570 mm.

Colour.—Silvery, a black blotch on opercle, and numerous black or dark spots on sides ; a dark spot at base of each dorsal spine and ray.

Locality.—Lobito Bay.

Distribution.—West coast of Africa.

This species has not been actually recorded from further south than Lobito Bay, though there is said to be a specimen in the Berlin Museum from " Cape of Good Hope."

This species is very closely allied to the preceding, but appears to piffer in the slightly greater number of dorsal rays and scales along

the lateral line. With regard to the latter point, however, Pellegrin gives l.l. 50–54 ; l.tr. $\frac{6\text{–}7}{14\text{–}15}$.

Pomadasys bennetti (Lowe).

Rock Grunter ; Chor-chor ; Vaartje.

1841. Lowe, Tr. Zool. Soc., vol. ii, p. 176.

1836–44. Valenciennes in Webb and Berthelot, Iles Canar. Poiss., p. 25, pl. vii, fig. 2 (*ronchus*), and p. 26.

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 46.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 353.

1917. Jordan and Hubbs, Ann. Carn. Mus., vol. xi, p. 465, pl. xlvii and text-fig. 1.

1919. Fowler, Proc. U.S. Nat. Mus., vol. lvi, p. 283.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 230.

Depth $2\frac{2}{3}$–$2\frac{4}{5}$, length of head $2\frac{3}{4}$–3, in length of body. Eye 4–$4\frac{1}{2}$ in length of head, $1\frac{1}{3}$–$1\frac{1}{2}$ in snout, 1–$1\frac{1}{4}$ in interorbital width. Maxilla reaching to below nostrils or anterior margin of eye. Gill-rakers 13–14 on lower part of anterior arch. D XII 15–17, 4th spine longest. A III 12, 2nd spine stronger but not longer than 3rd. Scales : l.l. 50–55 ; l.tr. $\frac{7\text{–}8}{16\text{–}18}$. Lateral line tubes simple. (Plate XXVIII, fig. 2.)

Length.—Up to 550 mm.

Colour.—Silvery, brownish or olivaceous on back ; with a black spot on opercle, otherwise uniform, though sometimes a few spots ; dorsal brownish.

Locality.—Mossamedes, False Bay, Agulhas Bank to Natal and Zululand.

Distribution.—Mediterranean, Port Said, west coast of Africa. Not yet recorded from between Mossamedes and Table Bay.

Pomadasys hasta (Bl.).

Spear-spined Grunter.

1797. Bloch, Ichthyol., pl. ccxlvi, fig. 1.

1878–88. Day, Fish. India, p. 74, pl. xix, figs. 3, 4.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 353 (references).

1925. Fowler, J. Bomb. Nat. Hist. Soc., vol. xxx, p. 319.

1925. *Id.*, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 231.

Depth $2\frac{1}{2}$–$2\frac{4}{5}$, length of head $2\frac{2}{5}$–$2\frac{2}{3}$, in length of body. Eye $3\frac{2}{5}$–4 in length of head, slightly less than snout, equal to interorbital width. Maxilla reaching to below anterior margin of eye. Gill-rakers 12–13 on lower part of anterior arch. D XII 13–15, spines very strong, 3rd and 4th longest, last longer than penultimate. A III 6–8, spines very strong, 2nd stronger and longer than 3rd. Scales : l.l. 46–52 ; l.tr. $\frac{7}{10\text{–}12}$. Lateral line tubes simple.

Length.—Up to 450 mm.

Colour.—Silvery, with a black spot on opercle, and 5–6 interrupted vertical dark bars ; spinous and soft dorsal with dark spots ; margin of dorsal and caudal dusky. The spots on fins and dark markings on body often become obsolete in adults.

Locality.—Natal coast, Delagoa Bay.

Distribution.—Indian seas, East Indies to Australia.

**Pomadasys guoraka* (Russ.).

1803. Russell, Fish. Vizag., vol. ii, p. 24, pl. cxxxii.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 256.

1877. Bleeker, Atl. Ichthyol., vol. viii, p. 30, pl. cccxx, fig. 4 (*argyreus*), and p. 30, pl. cccxxiii, fig. 1.

1878–88. Day, Fish. India, p. 75, pl. xx, fig. 1.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 232.

Depth $2\frac{2}{5}$–$2\frac{4}{5}$, length of head 3, in length of body. Eye $2\frac{1}{2}$ (young)–5 (adult) in length of head, greater than (young) or $1\frac{1}{2}$ (adult) in snout. Maxilla reaching to below anterior margin of eye or slightly beyond. Gill-rakers 12 on lower part of anterior arch. D XII–XIII 11–14, spines strong, 3rd and 4th longest, last slightly longer than penultimate. A III 7–8, spines strong, 2nd longer and stronger than 3rd. Scales : l.l. 43–50 ; l.tr. $\frac{56}{12}$. Lateral line tubes simple (?).

Length.—Up to 400 mm.

Colour.—Silvery, darker above, a blackish opercular spot, snout dark, dorsal grey with darker margin ; in the young an indistinct dark band along middle of body, and the greater part of opercle suffused with darker.

Locality.—Delagoa Bay.

Distribution.—Indian seas, East Indies.

Closely allied to *hasta*, but with slightly fewer scales.

Pomadasys maculatum (Bl.).

Blotched Grunter.

1797. Bloch, Ichthyol., pl. cccxxvi, fig. 2.
1876. Bleeker, Atl. Ichthyol., vol. viii, p. 27, pl. cccviii, fig. 2.
1878–88. Day, Fish. India, p. 74, pl. xix, fig. 5.
1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321.
1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 230.

Depth $2\frac{2}{3}$–$2\frac{4}{5}$, length of head 3, in length of body. Eye $3\frac{1}{2}$–4 in length of head, equal to interorbital width, equal to or slightly less than snout, which is blunt. Maxilla reaching to below anterior border of eye. Gill-rakers 13–14 on lower part of anterior arch. D XII(–XIII) 12–14, 4th spine longest, last spine longer than penultimate. A III 7, 2nd spine stronger and longer than 3rd. Scales : l.l. 52–56 ; l.tr. $\frac{7\text{–}8}{12\text{–}14}$. Lateral line tubes simple.

Length.—Up to 450 mm.

Colour.—Silvery, with 4 dark cross-bars, sometimes divided into large blotches ; spinous and soft dorsal dusky, light along base ; snout and margins of dorsal and caudal blackish.

Locality.—Natal coast, Delagoa Bay, Chinde.

Distribution.—Indian seas, East Indies.

Pomadasys multimaculatum (Playf.).

Bull-grunter.

1866. Playfair in Playfair and Günther, Fish. Zanz., p. 23, pl. iii, fig. 3.
1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 354 (references).

Depth $2\frac{3}{4}$–3, length of head $2\frac{4}{5}$, in length of body. Eye $4\frac{1}{2}$–5 in length of head, $1\frac{1}{2}$–$1\frac{4}{5}$ in snout, 1–$1\frac{1}{3}$ in interorbital width. Snout pointed. Maxilla reaching to below nostrils. Gill-rakers 12 on lower part of anterior arch. D XII 13, 3rd spine longest, ultimate spine longer than penultimate. A III 7, 2nd spine longer and much stronger than 3rd. Scales : l.l. 50–54 ; l.tr. $\frac{6\text{–}7}{13\text{–}15}$. Lateral line tubes anteriorly bifurcate, but most of them simple.

Length.—Up to 300 mm.

Colour.—Silvery ; head, body, and dorsal fin with small dark spots ; on the body a spot at base of each scale.

Locality.—Natal coast.

Distribution.—East coast of Africa.

This species is liable to confusion with *operculare*, but the spots are smaller, the scales larger, and the anal rays fewer.

Pomadasys striatum (G. and T.).

Striped Grunter.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 153.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 354.

Depth $2\frac{3}{5}$–$2\frac{4}{5}$, length of head $2\frac{4}{5}$–3, in length of body. Eye $3\frac{1}{2}$ in length of head, equal to interorbital width, slightly less than snout. Maxilla reaching to below posterior nostril. Gill-rakers 10–11 on lower part of anterior arch. D XI–XII 13–14, 5th or 4th and 5th spines longest, last spine not longer than penultimate. A III 6, 2nd spine stronger and slightly longer than 3rd. Scales : l.l. 58–62 ; l.tr. $\frac{12}{24}$. Lateral line tubes mostly bifurcate.

Length.—Up to 190 mm.

Colour.—Silvery, with three dark, longitudinal stripes, the upper one following the dorsal profile, the middle one from above orbit following lateral line to end of soft dorsal, where it meets the lower one which runs horizontally from eye to caudal.

Locality.—Natal coast, Delagoa Bay.

Type in South African Museum.

I have seen only the type and one other example of this species. The scales are more numerous than is stated in the original description. In general aspect this fish resembles a *Plectorhynchus* rather than a *Pomadasys*, but it possesses the characteristic median pit on the chin. It is sharply distinguished from all the other South African species by the large number of scales in transverse series. In coloration it is very similar to *stridens* Forsk. (figured by Day, Fish. India, pl. xviii, fig. 8 as *nageb*), and might pass as a variety but for the more numerous scales above and below the lateral line.

Fowler's specimen (1925, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 230) may be *stridens* ; it is certainly not *striatum*.

Pomadasys furcatum (Bl. Schn.).

Banded Grunter.

1801. Bloch Schneider, Syst. Ichthyol., p. 187, pl. xliii.

1876. Bleeker, Atl. Ichthyol., vol. viii, p. 26, pl. ccclii, fig. 2.

1878–88. Day, Fish. India, p. 73, pl. xix, fig. 2.

1908. Regan, Ann. Nat. Mus., vol. i, p. 251, pl. xxxix (*taeniophorus*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 354 (*taeniophorus*).

Dorsal profile elevated, especially in adult. Depth $2\frac{1}{3}$–$2\frac{1}{2}$, length of head 3–$3\frac{1}{2}$, in length of body. Eye $2\frac{2}{3}$–$3\frac{1}{2}$ in length of head, equal to or slightly longer than snout and equal to interorbital width. Snout blunt. Maxilla reaching to below anterior margin or anterior third of eye. Gill-rakers 12 on lower part of anterior arch. D XII (–XIII) 14–16, 3rd or 4th spine longest. A III 7–9, 2nd spine longer and much stronger than 3rd. Scales : l.l. 54–60 ; l.tr. $\frac{7-8}{18-19}$. Lateral line tubes anteriorly bifurcate, posteriorly simple.

Length.—Up to 380 mm.

Colour.—Silvery, with 5–6 dark longitudinal bands, more or less bifurcating anteriorly ; spinous dorsal dusky, soft dorsal dusky or with a series of spots, margin of caudal dusky.

Locality.—Natal and Zululand coast.

Distribution.—Indian seas, East Indies.

Type of *taeniophorus* in British Museum.

Characterised by the high dorsal profile and blunt snout.

Fam. 45. Maenidae.

Body oblong, with moderate-sized ctenoid scales. Mouth very protractile. Maxilla almost completely concealed under the preorbital. Subocular shelf small. Teeth villiform in jaws and sometimes on vomer, none on palatines or tongue. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. A single dorsal fin, not notched, the spinous portion longer than the soft. Anal about equal to the soft dorsal, with 3 spines. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal forked. Air-bladder present. Pyloric caeca few. Lateral line single.

A small family closely allied to the *Sparidae*, comprising two genera:

Maena Cuv.* from the Mediterranean, and *Marsis* from the Mediterranean, Eastern Atlantic, Ceylon, and South Africa.

Gen. Marsis nom. nov.

1817. Cuvier, Règne Anim., vol. ii (*Smaris* non Latreille 1796, Arachn.).

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 403 *Smaris*).

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 387 (*Smaris*).

No vomerine teeth.

Key to the South African species.

1. No black spot at base of caudal fin. A III 7–8 . . . . *australis.*
2. A black spot at base of caudal fin. A III 15 . . . *melanurus.*

Marsis australis (Regan).

1921. Regan, Ann. Mag. Nat. Hist., (9), vol. vii, p. 416 (*Smaris a.*).

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 70 (*Smaris a.*).

Depth 3–3$\frac{1}{3}$, length of head 2$\frac{3}{4}$–3, in length of body. Eye 3 in length of head, a little greater than snout, which equals interorbital width. Maxilla extending to below anterior margin of eye. Gill-rakers 18–20 on lower part of anterior arch. D XII 9–10. A III 7–8. Scales : l.l. 58–60 ; l.tr. $\frac{6}{14}$. Pyloric caeca 3. (Plate XXVIII, fig. 3.)

Length.—Up to 270 mm.

Colour.—Uniform (as preserved).

Locality.—Natal coast, 114–192 fathoms.

Type in British Museum ; topotypes in South African Museum.

**Marsis melanurus* (C. and V.).

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 422.

1882. Steindachner, Denk. Ak. Wiss. Wien, vol. xliv, p. 26, pl. ii, fig. 2.

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 51.

D X 16 (C. and V.) or D XII 15 (Günther). A III 15–16. Scales : l.l. 66 ; l.tr. $\frac{8}{15}$. Pyloric caeca 7.

Length.—Up to 200 mm.

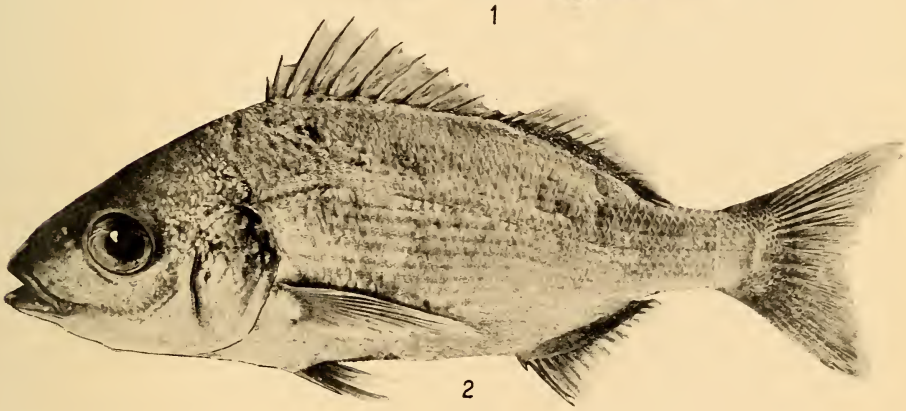
* Not the same as *Maenas* Klein (inadmissible under Opinion 21, Intern. Comm.), or *Maenas* Hübn. 1816 (Lepidoptera).

PLATE XXVIII.

FIG.		TEXT-PAGE
1.	*Scorpis lithophilus* G. and T. (original photo)	663
2.	*Pomadasys bennetti* (Lowe) (original photo)	677
3.	*Marsis australis* (Regan) (original photo)	682
4.	*Sparus durbanensis* (Cast.) (original photo)	688



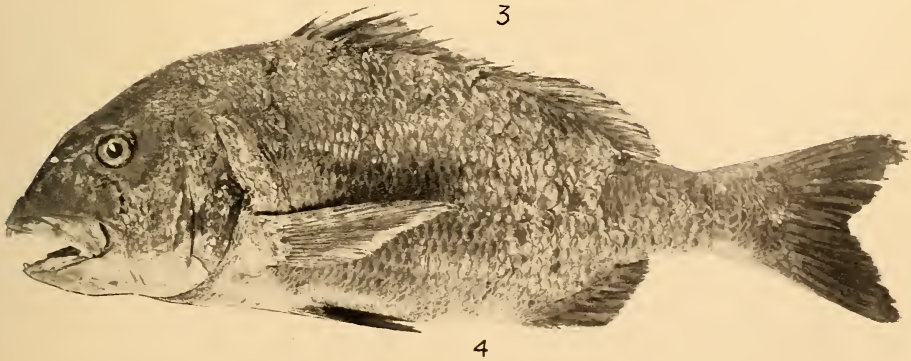
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3



4

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Colour.—Leaden, with yellowish reflections above, silvery below, a large black spot at base of caudal fin and a smaller one at base of pectoral, fins olivaceous.

Locality.—Mossamedes (Pellegrin).

Distribution.—Gorée, Cape Verde.

Fam. 46. Sparidae.

Body oblong or ovate, more or less elevated, compressed, with rather large, feebly crenulate (never truly ctenoid) scales. Mouth rather small, nearly horizontal, moderately protractile. Maxilla slipping under preorbital for most of its length, without supplemental bone. Teeth villiform, conical, incisor-like, or molariform; none on vomer (except *Evynnis*) or palatines. Nostrils paired. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Dorsal fin single, sometimes deeply notched. Anal spines 3. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal more or less emarginate or forked. Lateral line single. Air-bladder present. Pyloric caeca few. A strong subocular shelf.

A large family of carnivorous shore fishes, especially abundant in tropical and subtropical waters; a few species entering estuaries and rivers.

So far as is known all the species reproduce by means of pelagic eggs, with the possible exception of *Caranthus*.

Most of the species are valued as food, and especially in South Africa the family is one of the most important economically.

From an angling point of view several species provide excellent sport on the Cape and Natal coasts.

Key to the South African genera.

I. With molar teeth.
  A. Molars strong, lateral.
    1. A front row of incisors.
      a. Incisors vertical or nearly so . . . . *Sparus.*
      b. Incisors oblique, protruding . . . . *Diplodus.*
    2. Four to six strong canines in front . . . . *Pagrus.*
    3. Teeth in cardiform bands, without incisors or canines . *Pagellus.*
  B. Molars very small in a single lateral series. A row of oblique protruding incisors in front . . . . . *Charax.*
  C. Molars small, forming the innermost row of a band of teeth.
    1. Outer row incisor-like, crenulate . . . . *Crenidens.*
    2. Outer row conical, but no canines . . . . *Boopsidea.*

II. Without molar teeth.

A. With canines in front . . . . . *Dentex.*

B. Broad band of teeth in front, outer row largest, but no canines.

1. Teeth lanceolate . . . . . *Caranthus.*

2. Teeth tricuspid . . . . . *Tripterodon.*

C. A single series of broad incisors in front.

1. No inner rows of teeth. Both nostrils pore-like . . . *Box.*

2. An inner band of small teeth. Posterior nostril slit-like *Gymnocrotaphus.*

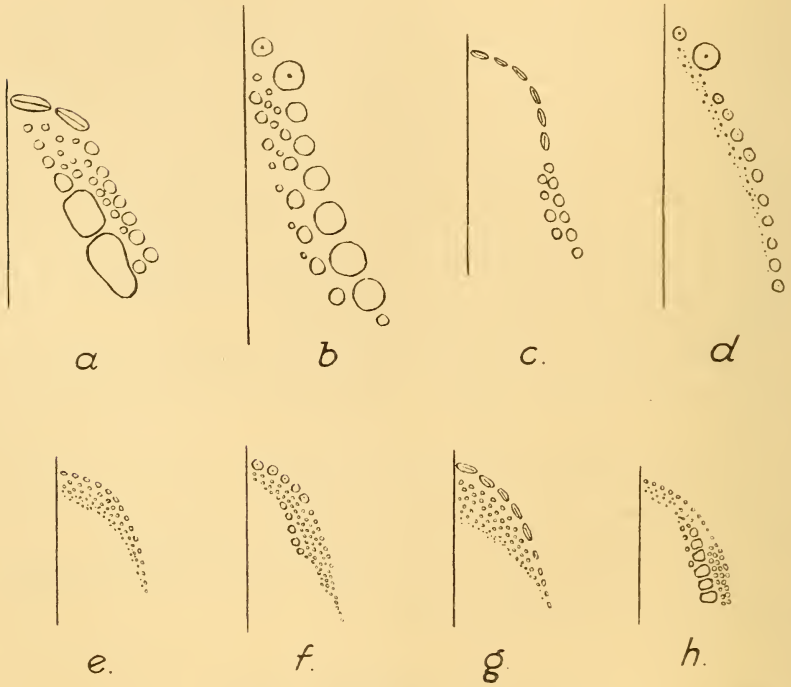


Fig. 22.—Diagrams of dentition (left side upper jaw) of Sparoids. a, *Sparus globiceps*; b, *Pagrus nasutus*; c, *Diplodus cervinus*; d, *Dentex undulosus*; e, *Caranthus emarginatus*; f, *Boopsidea inornata*; g, *Gymnocrotaphus curvidens*; h, *Pagellus mormyrus.* Incisor teeth represented by ovals with lines through them; canines and larger conical teeth by circles with central dots; molars by plain circles, ovals, or oblongs; small circles and dots represent minute conical teeth.

Gen. Sparus (Art.) Linn.

1738. Artedi, Gen. Pisc., p. 35.

1758. Linné, Syst. Nat., ed. 10, p. 277.

Four to six compressed incisors, implanted vertically or nearly so,

in both jaws ; a series of molars at the sides, 4–5 in upper, 2–3 in lower jaw, of which the innermost series is always the largest. In the young the hindmost 3 or 4 molars of the inner row are more or less transversely oval or oblong, forming a kind of pavement ; in the adult, of some species at least, the last 1 or 2 of these molars become very large, longitudinally oval, and flat-topped. Cheeks scaly. Interorbital scaleless. Posterior nostril a narrow slit.

The dentition, scaleless interorbital, and slit-like posterior nostril are clean-cut characters separating the species of this genus, of which *auratus* is the genotype, from those of *Pagrus* (*Chrysophrys*).

Key to the South African species.

1. Incisors even, the median pair not markedly larger than the others.
   a. Body shallower, with vertical black bars . . . . *globiceps.*
   b. Body deeper, with more or less distinct longitudinal lines . *sarba.*
2. Incisors unequal, the median pair much larger and more prominent than the others . . . . . *durbanensis.*

Sparus globiceps (C. and V.).

White Stumpnose.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 100.

1861. Steindachner, Verh. Zool. Bot. Ges. Wien, vol. xi, p. 180 (*Sargus natalensis*).

1907. Schultze, Abh. Deutsch. Seefisch. Ver. Berl., vol. ix, p. 9, pl. ii (after Bloch).

1908. Regan, Ann. Nat. Mus., vol. i, p. 253, pl. xli (*Sargus nigrofasciatus*).

1914. *Id.*, Mar. Biol. Rep., vol. ii, p. 100 (habits).

1915. Clark, Sci. Res. " Scotia," vol. iv, p. 396 (*nigrofasciatus*).

1916. Gilchrist, Mar. Biol. Rep., vol. iii, p. 4, fig. 1 (egg and larva).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 359 (*nigrofasciatus*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 92 (references).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 19.

Profile of head sloping, convex, gibbous in front of eyes. Depth $2\frac{1}{3}$–$2\frac{2}{3}$, length of head 3, in length of body. Eye $3\frac{1}{2}$ (young)–$4\frac{1}{2}$ (old) in length of head, $1\frac{1}{3}$–$1\frac{2}{3}$ in snout, $1\frac{1}{3}$–$1\frac{1}{2}$ in interorbital width, a little greater than (young) to about equal to depth of preorbital. Preorbital longer than deep, not reaching down to angle of mouth, lower margin straight (young) or somewhat concave (adult) ; 4–6 incisors

in each jaw, contiguous, even the middle ones not markedly larger than the others ; 4–5 series of molars in upper, 2–3 in lower jaw, the inner series always largest, in young transversely oval or oblong, in adult the hindermost 1 or 2 longitudinally oval and very large. Gill-rakers 8–9 on lower part of anterior arch. D XI 11–12, 3rd–5th spines longest. A III 10–11, 2nd spine rather shorter but stouter than 3rd. Scales : l.l. 58–61 ; l.tr. $\frac{6}{14\text{–}16}$; 6(–7) series on cheek ; limb of pre-opercle and whole of interorbital scaleless.

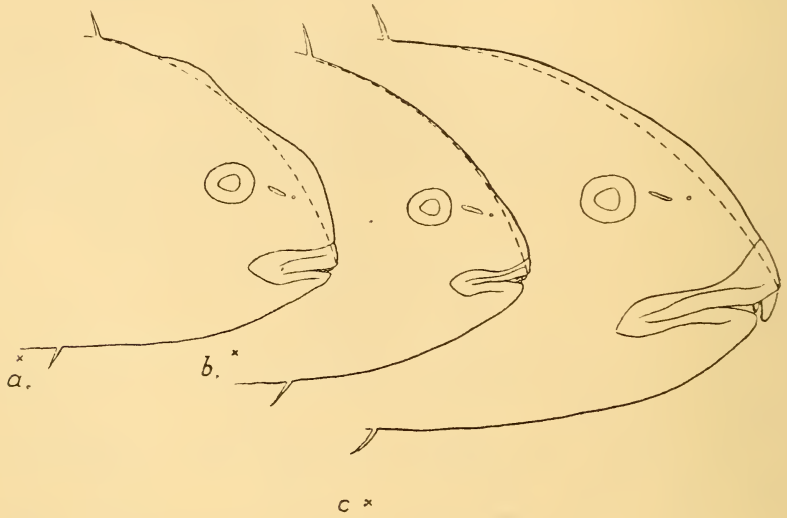


Fig. 23.—Outlines of heads of : a, *Sparus globiceps* (400 mm.) ; b, *S. sarba* (350 mm.) ; and c, *S. durbanensis* (550 mm.) (diagrammatic). a, b, c are the respective centres of arcs drawn between the first dorsal spine and the tip of the upper jaw.

Length.—Up to 500 mm.

Colour.—Silvery, greyish above, whitish below ; 5–7 narrow vertical black bars, which often disappear with increasing age ; often more or less distinct longitudinal dark lines, margins of opercle and axil of pectoral usually dark, a golden or bronzy band between eyes ; fins greyish, dorsal often with darker margin, iris golden.

Locality.—Coast of South West Africa, Saldanha Bay, Table Bay, False Bay, and Agulhas Bank to Algoa Bay and Natal, down to 40 fathoms.

Type of *Sargus nigrofasciatus* in British Museum.

The White Stumpnose is a well-known and valuable Cape fish, occurring often in vast shoals. It does not appear to extend regularly far to the east, preferring the colder waters of the west coast.

It is very similar to the Mediterranean *C. aurata* ; *aurata* is said to have a deeper preorbital, but this feature is variable according to age.

Sparus sarba Forsk.

Silver Bream (Natal) ; *River Stumpnose* (Eastern Province).

1775. Forskal, Descr. Anim., p. 31.

1843. Temminck and Schlegel, Faun. Jap. Poiss, p. 67, pl. xxxi (*aries*).

? 1861. Castelnau, Mem. Poiss. Afr. Austr., p. 25 (*natalensis*).

1878–88. Day, Fish. India, p. 142, pl. xxxiv, fig. 6.

? 1881. Steindachner, SB. Ak. Wiss. Wien, vol. lxxxiii, p. 30, pl. 3 (*Sargus holubi*).

1912. Jordan and Thompson, Proc. U.S. Nat. Mus., vol. xli, p. 581, fig. 9 (*aries*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 361 (*natalensis*), and p. 362 (references).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 21 (*Sargus holubi*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 234 (*nigrofasciatus* non Regan).

1925. *Id.*, *ibid.*, p. 237, fig. 4 (*natalensis*).

Profile of head convex, snout rather steeply inclined, interorbital rather prominent. Depth 2–2$\frac{1}{5}$, length of head 3–3$\frac{1}{3}$, in length of body. Eye 3–4$\frac{1}{2}$ in length of head, 1–2 in snout, 1–1$\frac{3}{4}$ in interorbital width, greater than (young) to 1$\frac{1}{3}$ in (adult) depth of preorbital. Preorbital longer than deep, not reaching down to angle of mouth, lower margin slightly concave in young, more so in adult. Four to six incisors in upper, 6–8 in lower jaw ; 4 series of molars in upper, 3 in lower jaw, the inner rows larger than the outer. Gill-rakers 8 on lower part of anterior arch. D XI 12–13, 4th spine longest. A III 11, 2nd spine stronger than 3rd. Scales : l.l. 56–64; l.tr. $\frac{7}{13–15}$; 5–6 series on cheek; limb of preopercle almost or quite scaleless ; interorbital scaleless.

Length.—Up to 450 mm.

Colour.—Silvery, with golden or brownish longitudinal stripes, often a dark spot at beginning of lateral line ; fins yellowish or greyish,

margin of dorsal usually with narrow dark edge, iris yellow, axil of pectoral often dark.

Locality.—Algoa Bay, East London, Natal and Zululand coast, Delagoa Bay.

Distribution.—East coast of Africa, Indian seas to China and Japan. The young often enter estuaries and lagoons.

In general aspect and details closely resembling the White Stumpnose (*S. globiceps*); in fact, it is extremely difficult to separate the young of the two species. The adults, and the half-grown also, though less satisfactorily, can be distinguished by the following features: in *sarba* the body is more elevated, the profile from tip of snout to origin of dorsal is an arc of a circle whose centre lies on the belly, midway between base of ventrals and vent, the antorbital bulge scarcely, if at all, transgresses the line of this arc (see fig. 23 b); the incisors are more conical, less chisel-edged; the hindmost inner molars do not become (even in a specimen 350 mm. long) greatly enlarged and longitudinally oval; the longitudinal streaks on the body are more pronounced.

The black spot on the lateral line, it may be noted, occupies the same position as does the first black cross-bar in *globiceps*.

Steindachner's *Sargus holubi* appears to belong here. It is said to have cloudy black cross-bands, though Regan (1908, Ann. Natal Mus., vol. i, p. 254) states that it is uniform. Specimens identified at the British Museum by Boulenger certainly belong to *sarba*.

Sparus durbanensis (Cast.).

White Biskop (Cape); *Sandstompkop* (Mossel Bay); *Brusher* (Natal).

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 18.

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 230.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 359.

Profile of head sloping, nearly evenly convex. Depth $2\frac{4}{5}$–3, length of head $3\frac{1}{5}$–$3\frac{1}{2}$, in length of body. Eye 6–$6\frac{1}{2}$ in length of head, 2–$2\frac{1}{2}$ in snout, $2\frac{3}{4}$–3 in interorbital width, $1\frac{1}{3}$–$1\frac{1}{2}$ in depth of preorbital. Preorbital longer than deep, its lower margin slightly concave. Four incisors in each jaw, the middle pair much larger than the others, curved, the upper pair overlapping the lower lip when mouth closed; molars in 4–5 series in upper, 2–3 in lower jaw, the hindermost ones of the inner row very large. Gill-rakers 8–9 on lower part of anterior arch. D XI 11, 3rd–5th spines longest. A III 10.

Scales : l.l. 59–61 ; l.tr. $\frac{6\text{–}7}{14\text{–}16}$; 7 series on cheek ; limb of preopercle and whole of interorbital scaleless. (Plate XXVIII, fig. 4.)

Length.—Up to 1000 mm.

Colour.—Silvery, sometimes with a bluish tinge above, fins whitish or greyish ; young with 6–7 longitudinal narrow brownish stripes, which disappear in adult.

Locality.—False Bay, Agulhas Bank, Algoa Bay to Natal.

The White Poenskop or Biskop is a fine sporting fish. It is frequent on the Agulhas Bank, less so in False Bay, and is only a winter visitor on the Natal coast.

It is perhaps a little doubtful whether this species should be included in *Sparus* or *Diplodus*. The incisors are certainly rather more obliquely implanted than in the White Stumpnose, but not nearly so obliquely as in typical *Diplodus*, and they have rounded, not square, chisel-like edges ; the molars are quite similar to those of *globiceps*.

In general facies, moreover, this species is a *Sparus* and not a *Diplodus*.

Gen. Diplodus Raf.

1810. Rafinesque, Ind. d'Ittiol. Sicil., p. 54.

1817. Cuvier, Règne Anim., ed. 1, p. 272 (*Sargus* non Fabr. *Diptera*).

A single front row of strong incisors, implanted more or less obliquely, and several lateral rows of rounded molars in both jaws. Cheek scaly. Posterior nostril more or less slit-like. Tubes of the lateral line in some cases bifurcate towards the hinder end of body.

Omnivorous fishes of moderate size from the Mediterranean, warmer parts of Atlantic, and southern and eastern coasts of Africa to India ; often entering, especially when young, estuaries and lagoons.

The dentition closely resembles that of *Sparus*, but the incisors are implanted more or less obliquely, and they are more markedly chisel-edged.

Key to the South African species.

1. Broad black vertical bands. Lips thick and fleshy . . . *cervinus.*
2. A large black blotch on caudal peduncle. Dark bands, if present, narrow. Lips not thick and fleshy . . . . *rondeleti* var. *capensis.*

D. auriventris (Peters), from Mozambique, is not included here, as Steindachner's later description (Ichth. Beitr., vol. v, p. 156, 1876) is not available.

Two species previously placed in this genus, *holubi* and *nigrofasciatus*, are here transferred to *Sparus*.

Diplodus cervinus (Lowe).

Zebra ; Wilde-Paard ; Streep-dasje.

1841. Lowe, Trans. Zool. Soc. Lond., vol. ii, p. 177.

1849. Smith, Illustr. Zool. S. Afr. Pisces, pl. xxiii, fig. 1 (*Sargus hottentotus*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 359 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 87 (references).

Profile sloping. Depth 2–2⅓, length of head 2½ (young)–3 or 3¼, in length of body. Eye 3 (young)–5½ in length of head, 1 (young)–2½ in snout, 1 (young)–2 in interorbital width, twice the depth (young) or 1½ in depth of preorbital. Preorbital entirely concealing maxilla. Lips very thick and fleshy, especially in large examples. Incisors oblique, 12 in upper, 8 in lower jaw ; molars small, in two series in both jaws. Gill-rakers 9–10 on lower part of anterior arch. D XI 12–13, 4th spine longest, about ½ (young) to about ⅓ length of head. A III 11. Scales : l.l. 60–68 ; l.tr. $\frac{9-10}{18}$; 4–5 series on cheek ; limb of preopercle naked. Tubes of lateral line bifurcate on hinder part of body and caudal peduncle.

Length.—Up to 500 mm.

Colour.—Silvery (young) or more greyish in adult, with 5–6 broad black vertical cross-bands, the 1st through the eye, the 2nd through shoulder, the 6th (often faint or even absent) across caudal peduncle ; snout black ; dorsal, anal, and ventrals blackish.

Locality.—Saldanha Bay, Table Bay, False Bay to East London and Natal.

Distribution.—Cap Blanc, Madeira, Canary Islands.

Type of *Sargus hottentotus* in British Museum.

The Zebra is a gregarious fish, going about in small shoals. It is very common in False Bay, though large examples are rarely caught inshore.

Diplodus rondeleti (C. and V.).

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 14, pl. cxli.

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 52.

var. *capensis* Smth.

Dasje (Cape); *Black-tail* (Natal).

1849. Smith, Illustr. Zool. S. Afr. Pisces, pl. xxiii, fig. 2.

1887. Boulenger, Proc. Zool. Soc. Lond., p. 658.

1914. Gilchrist and Thompson, Mar. Biol. Rep., vol. ii, p. 96 (habits).

1916. Gilchrist, *ibid.*, vol. iii, p. 5 (egg).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 359.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 87 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 233.

Profile sloping. Depth about 2, length of head $2\frac{2}{3}$–$3\frac{1}{2}$, in length of body. Eye $2\frac{1}{2}$ (young)–$5\frac{1}{2}$ (adult) in length of head, greater than (young) to $1\frac{2}{3}$ in snout, greater than (young) to $2\frac{1}{3}$ in interorbital width. Depth of preorbital $2\frac{1}{3}$ in eye-diameter (young), slightly greater than eye in adult. Preorbital with lower margin straight or slightly concave, completely concealing maxilla. Lips not thick and fleshy. Incisors oblique, 8 in both jaws; molars in 3–4 series in upper, 2–3 in lower jaw. Gill-rakers 9–10 on lower part of anterior arch. D XII 14 (Günther gives XI–XII 12–15 for *rondeleti* and XII 14–16 for *capensis*), 4th and 5th spines longest, $\frac{2}{3}$–$\frac{1}{3}$ length of head. A III 13–14. Scales: l.l. 66–74; l.tr. $\frac{8}{16\text{–}18}$; 5–6 series on cheek; limb of preopercle naked. Tubes of lateral line simple.

Length.—Up to 370 mm.

Colour.—Silvery, often light or dark greyish in old examples, with more or less conspicuous silvery or dark longitudinal streaks along the rows of scales, and 4–5 narrow dark cross-bars, which vary in intensity, and are often scarcely visible; a broad black band across the caudal peduncle (sometimes faint or absent); fins pale or greyish, axil of pectoral more or less distinctly dark.

Locality.—Mossamedes (typical form), Saldanha Bay, False Bay to Natal and Zululand, often entering estuaries and lagoons.

Distribution.—Madagascar, Arabian coast, Persian Gulf.

The typical form occurs in the Mediterranean, Madeira, Canary Islands, and on the coast of Angola. The var. *capensis* has been recorded also from Bermuda and St. Helena, but these records would seem more applicable to the typical form. The variety is said to

differ from the typical form in the series of incisors forming a rather stronger curve and in the indistinctness of the dark cross-bars (Boulenger, *loc. cit.*, 1887). The latter feature, however, is a very variable one, and it is doubtful whether *capensis* should be maintained even as a variety.

Type of *capensis* in British Museum.

The Dasje lives in shoals and is very common in False Bay and further eastwards, but appears to be unknown in Table Bay, though I have seen a specimen from Saldanha Bay.

Gen. Pagrus Cuv.

1817. Cuvier, Règne Anim., ed. 1, p. 272.

1817. *Id.*, *ibid.*, p. 272 (*Chrysophrys*).

? 1839. Swainson, Nat. Hist. Fishes, vol. ii, p. 221 (*Chrysoblephus*).

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 465.

? 1860. Bleeker, Nat. Tyds. Ned. Ind., vol. xxi, p. 61 (*Pagrichthys*).

Four to six strong canines in both jaws (usually 4 in upper, 6(–8) in lower), a series of more or less strong molars at the sides, with inner series of smaller molars in both jaws ; molars in (1)2–5 series in upper, 2–5 in lower jaw. Cheeks and interorbital scaly. Preorbital deep. Posterior nostril oval.

Carnivorous fishes from warm seas, often growing to a large size, and all valuable food-fishes.

There is really no hard and fast distinction between the genera *Pagrus* and *Chrysophrys* ; the former has only two series of molars in the upper jaw, and the scaling on the interorbital continued further forward. With regard to *Chrysoblephus*, I have not seen Swainson's work, but Jordan and Thompson (1912, Proc. U.S. Nat. Mus., vol. xli, p. 580) state that the *median* molars are very large, and give *gibbiceps* as the type species. This species, however, is one which does not possess this character, though *globiceps* does. I am unable to say whether a *lapsus calami*, or a misidentification on the part of Swainson, or a confusion of the hindermost with the innermost molars, is responsible for this discrepancy. In any case, *Chrysoblephus* must fall into synonymy, either of *Pagrus* or *Sparus*.

The identity of *Pagrichthys castelnaui* Blkr. (*loc. cit.*, p. 61) remains doubtful. The genus seems to have been founded on a mutilated specimen with only 2 anal spines. The fin formula is given as D XI 10–11. A II 8–9. Scales in l.l. 40.

A considerable amount of synonymy has arisen in regard to the

South African species of this genus, and it is hoped that the present work will help towards the elucidation thereof.

The most curious case is the confusion between the Roman and the Dageraad, whereby the former with a broad forehead has come to be known as *cristiceps*, and the latter with high occipital and nuchal crest as *laticeps*. Pappe and Castelnau seem to have been the originators of this reversal of names, which has been followed by later writers. Cuvier and Valenciennes' descriptions are perfectly clear as regards the shape of the head, and when read with the actual specimens before one are quite unmistakable.

Comparison also of further material from the Cape and Natal has shown that, with two exceptions, the supposed new species of *Chrysophrys* described by Gilchrist and Thompson are untenable.

P. unicolor Q. and G. has been omitted from the fauna-list as its presence in these waters rests solely on the doubtful record of Günther (1859, Cat. Fish. Brit. Mus., vol. i, p. 468).

Key to the South African species.

I. Molars in 2 series in upper jaw (*Pagrus*).
  A. None of the dorsal spines elongate, flexible.
    1. Pink. Ten series of cheek scales . . . . *uniarius.*
    2. Brownish. Sixteen series of cheek scales . . . *nasutus.*
  B. Third to fifth or sixth dorsal spines elongate, flexible, filamentous.
    1. Profile high. Third to seventh spines filamentous . *spinifer.*
    2. Profile sloping. Third to fifth spines filamentous . *ehrenbergi.*

II. Molars in 3 or more series in upper jaw (*Chrysophrys*).
  A. Nine or more series of scales between lateral line and origin of dorsal fin.
    1. Scales small : l.l. 73 . . . . . *dentatus.*
    2. Scales moderate : l.l. 55–67.
      a. Profile steep.
        i. Occiput and nape more or less gibbous, often strongly so.
          α. Scaling on cheek extending forwards under eye *gibbiceps.*
          β. Scaling on cheek not extending forwards under eye *anglicus.*
        ii. Occiput and nape forming a sharp ridge. Body (in adult) roughly triangular in shape . . . *cristiceps.*
      b. Profile sloping. Forehead broad, with a blue (dark) band *laticeps.*
  B. Five to seven series of scales between lateral line and origin of dorsal fin. Scales rather large : l.l. 40–50.
    1. Head with 2 black cross-bars. Scales l.l. 48–50 . . *bifasciatus.*
    2. Lighter or darker grey. Scales l.l. 43–46 . . . *berda.*

Pagrus laniarius C. and V.

Panga (Cape) ; *Dik-bekje* (Port Elizabeth).

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 163.

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 21.

1866. Pappe, Syn. Ed. Fish. Cape., ed. 2, p. 14.

1916. Gilchrist, Mar. Biol. Rep., vol. iii, p. 6 (egg).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 362.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 88.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 20.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 237.

Profile of head sloping, gently and evenly convex. Depth $2\frac{1}{3}$–$2\frac{1}{2}$, length of head 3 or a little less, in length of body. Eye $3\frac{1}{2}$–4 in length of head, $1\frac{1}{3}$–$1\frac{1}{2}$ in snout, subequal to interorbital width, greater than (young) or equal to (adult) depth of preorbital. Preorbital scaleless, its posterior margin sloping downwards and forwards to angle of mouth, lower margin straight. Gill-rakers 13 on lower part of anterior arch. Four canines in upper, 6 in lower jaw, the outermost ones strongest and projecting, especially those in upper jaw which curve outwards (sideways). D XII 10, spines strong, not filamentous, 4th and 5th longest. A III 8, spines stout, 2nd and 3rd about equal. Scales : l.l. 55–60 ; l.tr. $\frac{8}{18}$; 9–10 series on cheek ; limb of preopercle entirely scaly.

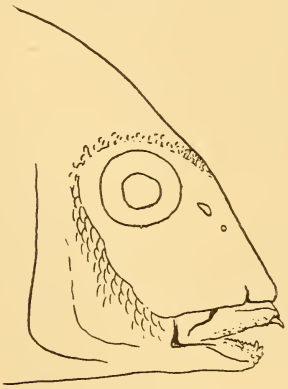


Fig. 24.—Outline of head of *Pagrus laniarius* to show shape of preorbital and forward limit of scaling (diagrammatic).

Length.—Up to 400 mm.

Colour.—Silvery-rose, with or without faint yellowish or bluish longitudinal stripes, fins pale rosy.

Locality.—Table Bay, False Bay, and Agulhas Bank to Algoa Bay, down to 45 fathoms.

The Panga is a very common fish on the markets. It seems to be somewhat rare in Table Bay, but is abundant on the Agulhas Bank. The outwardly curving canines are distinctive.

Fowler's description of the colour is too vivid for a living specimen, the mauve tints only appearing after death.

Pagrus nasutus (Cast.).

Black Biskop or Poenskop (Cape) ; *Musselcrusher* (Natal).

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 24.

1903. Boulenger, Ann. S. Afr. Mus., vol. iii, p. 67, pl. 7 (*nigripinnis*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 362 (*nigripinnis*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 88 (*nigripinnis*).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 20 (*nigripinnis*).

Profile of head sloping, gently convex. Depth $2\frac{1}{3}$–$2\frac{1}{2}$, length of head $2\frac{4}{5}$, in length of body. Eye $4\frac{1}{2}$–5 in length of head, $1\frac{3}{4}$–2 in snout, $1\frac{1}{2}$ in interorbital width, slightly less than depth of preorbital. Preorbital scaleless, its hind margin nearly vertical, the postero-inferior angle behind the angle of mouth, lower margin concave, at least in adult. Gill-rakers 10 on lower part of anterior arch. Four canines in each jaw, sometimes also 2 small median ones in lower jaw ; a row of large conical molars on sides, with smaller series within. Snout in large specimens thick and prominent, forming a " nose " depending over the upper lip. D XII 10, spines strong, not filamentous, 3rd–5th longest. A III 8, spines stout, 2nd and 3rd about equal. Scales : l.l. 62–65 ; l.tr. $\frac{10\text{–}12}{21\text{–}24}$; 16 series on cheek ; limb of preopercle partly scaly. (Plate XXIX, fig. 2.)

Length.—Up to 1000 mm.

Colour.—Greyish, irregularly blotched with darker, white below, fins greyish or blackish, ventrals pale (rosy) or dark, iris golden.

Locality.—False Bay, Agulhas Bank to Natal, down to 40 fathoms.

Type of *nigripinnis* in British Museum.

Castelnau's description of *nasutus* is quite unmistakable, and exactly fits two large specimens in the South African Museum, except for the slight discrepancy in fin formula (D XI 10, and A II 9), which may well have been due to a miscount. Boulenger's *nigripinnis* is a half-grown example. Thompson (*loc. cit.*, 1918) seems to have recognised the identity of *nasutus* and *nigripinnis*, but adopts Boulenger's later name.

The Poenskop or Musselcrusher grows to a large size, and at places like Hermanus on the Cape coast and in Natal offers excellent sport to the angler. It is frequent on the Agulhas Bank, but less so in False Bay.

As its name implies, this fish feeds mainly on molluscs, but also on crabs, and takes a fish-bait.

Pagrus spinifer (Forsk.).

1775. Forskal, Descr. Anim., p. 32.

1878–88. Day, Fish. India, p. 138, pl. xxxiii, fig. 5.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 363 (references).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 19, pl. v (*ciliaris*).

1923. *Id.*, *ibid.*, p. 20.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 234.

Profile of head, especially in large examples, elevated, nearly straight, with a protuberance in front of eyes. Depth $1\frac{4}{5}$–$2\frac{1}{3}$, length of head 3–$3\frac{2}{5}$, in length of body. Eye 3–5 in length of head, $1\frac{1}{2}$–3 in snout, equal to or less than interorbital width, equal to or less than depth of preorbital. Preorbital scaleless, its postero-inferior angle behind the angle of mouth. Four canines in each jaw, 2 series of molars on sides. Gill-rakers 10 on lower part of anterior arch. D XII 10, 1st 2 spines very short (scarcely projecting above the scales), 3rd longest, flexible, filamentous, reaching to base of caudal, shorter in adult, 4th–6th or 7th also flexible and filamentous. A III 8–9, 2nd and 3rd spines subequal. Scales : l.l. 50–55 ; l.tr. $\frac{6\text{–}7}{17\text{–}18}$; 6–7 series on cheek ; limb of preopercle scaleless.

Length.—Up to 600 mm.

Colour.—Silvery, rosy above, faint longitudinal pink lines along centre of each row of scales, fins pink, anal and ventrals whitish ; young with vertical bands.

Locality.—Natal coast, Delagoa Bay, down to 74 fathoms.

Distribution.—East coast of Africa, Indian seas, East Indies.

Type of *ciliaris* in coll. Govt. Mar. Survey.

**Pagrus ehrenbergi* C. and V.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 155.

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 471.

1882. Steindachner, Denks. Ak. Wiss. Wien, vol. lxv, p. 4, pl. v, fig. 1.

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 53.

Profile of head sloping. Depth $3\frac{1}{3}$ in total length (Günther). D XII 10, 1st 2 spines short but prominent, 3rd longest, flexible,

filamentous, reaching to soft dorsal, 4th and 5th also flexible and filamentous. A III 8–9. Scales : l.l. 54.

Length.—Not stated.

Colour.—Red, the back above the lateral line with blue spots.

Locality.—Mossamedes.

Distribution.—Mediterranean, west coast of Africa, Canary Islands.

I have not seen Steindachner's work and can give no further particulars than those contained in Cuvier and Valenciennes and Günther.

Pagrus dentatus (G. and T.).

Dane.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 173.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 361.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 18.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 236.

Profile of head sloping, straight. Depth $2\frac{1}{3}$, length of head 3, in length of body. Eye 4 in length of head, nearly 2 in snout, $1\frac{1}{4}$ in interorbital width, $1\frac{2}{3}$ in depth of preorbital. Preorbital as deep as long, reaching down to angle of mouth and completely concealing maxilla, lower margin straight ; 4 canines in upper, 6 in lower jaw, projecting forwards, followed by a band of cardiform teeth, molars in 3–4 series in upper, 2–3 in lower jaw. Gill-rakers, according to Fowler, 12 on lower part of anterior arch (gills removed in type). D XIII 11, 3rd longest. A III 9. Scales : l.l. 73 ; l.tr. $\frac{12}{23}$; 10 series on cheek ; limb of preopercle with a few isolated scales. Interorbital, as far as vertical from posterior nostril, scaly.

Length.—250 mm.

Colour (as preserved).—Pale brownish, with a series of darker streaks along each row of scales, a dark band between eyes (below interorbital scaling) ; in life reddish, with yellowish soft dorsal, anal, pectorals, and ventrals.

Locality.—Natal coast, Delagoa Bay, 25–50 fathoms.

Type in South African Museum.

Distinguished from all other South African species by the small scales, preorbital entirely concealing maxilla, and projecting canines.

Pagrus gibbiceps (C. and V.).

Red Stumpnose.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 127, pl. cxlvii.

1914. Gilchrist and Thompson, Mar. Biol. Rep., vol. ii, p. 97, fig. (habits).

1916. Gilchrist, *ibid.*, vol. iii, p. 5, fig. 2 (egg and larva).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 361.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 92 (references).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 18.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 234, text-fig. 3 (*Sparus lophus*).

Profile of head steep, snout concave, nape gibbous, in adults (? males only) with a more or less prominent rounded bump. Depth $2\frac{1}{5}$–$2\frac{2}{3}$, length of head $2\frac{3}{4}$–$3\frac{1}{4}$, in length of body. Eye $3\frac{1}{2}$–$4\frac{1}{2}$ in length of head, $1\frac{1}{2}$–2 in snout, $1\frac{1}{4}$–$1\frac{1}{2}$ in interorbital width, equal to (young), $1\frac{1}{2}$–$1\frac{2}{3}$ in (adult) depth of preorbital. Interorbital somewhat flattened in adult or with a bump of wrinkled and pitted spongy tissue. Preorbital longer than deep, extending behind angle of mouth and concealing to a large extent the maxilla, lower margin more or less concave in adult. Gill-rakers 10–12 on lower part of anterior arch. Four canines in upper, 4–6 in lower jaw, outermost series of molars the largest, the hinder ones in adults large, flat-topped, 4–5 inner series. D XII 10 (XI 11), 3rd and 4th spines longest, $\frac{1}{2}$–$\frac{2}{3}$ in length of head. A III (7)8–9, 2nd and 3rd spines subequal. Scales : l.l. 53–56 ; l.tr. $\frac{9\text{–}10}{19\text{–}21}$; 10–12 series on cheek, not including the patch which extends forwards under the eye ; limb of preopercle scaly.

Length.—Up to 500 mm.

Colour.—Pinkish, paler below and on sides of head, broad transverse alternating bands of bright red and white or pale pink, a whitish patch in front of eyes, fins rosy. Preserved specimens often show a dark band across the interorbital.

Locality.—Table Bay, False Bay, Agulhas Bank to Algoa Bay and Natal, down to 50 fathoms.

Type of *lophus* in Philadelphia Academy of Sciences.

The Red Stumpnose is one of the most esteemed of the Cape fishes. It is rare in Table Bay, but frequent on the Agulhas Bank. Its habit

of blowing holes in the sand in its search for shells and Crustacea is described by Gilchrist and Thompson (*loc. cit.*, 1914).

The maintenance of *lophus* as a distinct species appears to me to be very doubtful. It is based on a single specimen which differs from typical *gibbiceps* only in the greater length of the 3rd and 4th dorsal spines. Fowler's count of 15 cheek scales evidently includes the patch extending forward under the eye ; my count does not.

The length of the 3rd and 4th dorsal spines in typical *gibbiceps* is $\frac{1}{2}$–$\frac{2}{3}$ the length of the head ; but I have seen a specimen from Cape waters in which these spines reached $\frac{3}{4}$ the length of the head.

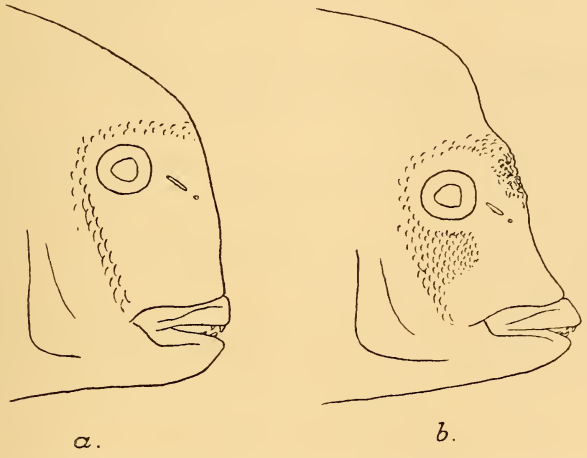


Fig. 25.—Outlines of heads of : a, *Pagrus anglicus* ; and b, *Pagrus gibbiceps*, showing forward limit of scaling (diagrammatic).

On the other hand, in examples from Natal, these spines are seen even on first glance to be longer than in the majority of Cape specimens. On measurement they prove to be from $\frac{2}{3}$–1 length of the head.

Where then can one draw the line between the Cape and Natal forms ? Is it possible that temperature of the water can affect the growth of two (or three) spines ?

It is not a question of age. Young and half-grown examples from Cape waters show short spines ; and a Natal specimen with long spines has the wrinkled and protuberant forehead so often seen in typical *gibbiceps*.

With more extensive material I believe a complete transition would be found between the short-spined and long-spined forms.

Pagrus anglicus (G. and T.).

Englishman.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 172.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 360.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 18.

Close to *gibbiceps* but distinguished by the following characters. Profile very steep, snout almost vertical and straight, nape sloping. Interorbital prominent. Preorbital as long as deep, scarcely extending behind angle of mouth, concealing less of the maxilla than in *gibbiceps*, its lower margin straighter. Scales : l.l. 65–67 ; l.tr. $\frac{10-11}{23-25}$. The cheek scales (11–12) not extending forward under eye, but ceasing on a line from hind margin of eye to hind angle of preorbital.

Length.—Up to 470 mm.

Colour.—Pinkish, silvery below, with darker vertical bands as in *gibbiceps*, a red stripe at base of pectorals, head dark red with a whitish patch in front of eyes.

Locality.—Natal coast, down to 40 fathoms.

Type in South African Museum.

This species seems to be commoner on the Natal coast than *gibbiceps*, and does not occur at the Cape. The scaling on the cheek serves at once to distinguish the two species.

Pagrus cristiceps (C. and V.).

Dageraad or Daggegraat (Cape) ; *Slinger* (Natal).

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 132.

1866. Pappe, Syn. Ed. Fish. Cape, ed. 2, p. 13 (*laticeps* non C. and V.).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 173 (*puniceus*).

1914. *Id.*, Mar. Biol. Rep., vol. ii, p. 101 (*laticeps* non C. and V.) (habits).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 362 (*puniceus*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 93 (*laticeps* non C. and V.).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 19 (*puniceus*).

Profile of head elevated, steeply sloping ; a sharp ridge from forehead to origin of dorsal ; in the young (150 mm.) the profile is less

elevated and the ridge less prominent. Depth, in adult greatest across hind margin of opercle, in young further back, not quite 2 (adult)–$2\frac{1}{3}$ (young), length of head $2\frac{3}{4}$–$3\frac{1}{4}$, in length of body. Eye $3\frac{3}{4}$ (juv.)–$5\frac{3}{4}$ in length of head, $1\frac{1}{3}$ (juv.)–$2\frac{1}{4}$ in snout, 1 (juv.)–2 in interorbital width, 1 (juv.)–$1\frac{3}{4}$ in depth of preorbital. Interorbital strongly convex. Preorbital longer than deep in young, at least as deep as long in adult, reaching almost to angle of mouth, its lower margin straight. Gill-rakers 10 on lower part of anterior arch. Four canines in upper, 4–6 in lower jaw; outermost molars largest, 3 inner rows in upper, 2 in lower jaw; none of the molars even in large examples becoming enlarged. Lips thick and fleshy, especially in adult, largely concealing the teeth. D XII 10, 4th spine longest. A III 8, 2nd and 3rd spines subequal. Scales: l.l. 59–61; l.tr. $\frac{9\text{–}10}{19\text{–}21}$; 10 series on cheek; limb of preopercle scaly. (Plate XXIX, fig. 1.)

Length.—Up to 600 mm.

Colour.—Rose-red, deeper and more of a crimson tinge above; the scales marked with golden and bluish reflections; lower margin of orbit and hind margin of opercle bluish (dark in preserved specimens); usually a dark spot in axil of pectoral and another at base of last dorsal ray; fins rosy.

Locality.—Table Bay, False Bay, and Agulhas Bank to Algoa Bay and Natal, down to 50 fathoms.

Type of *puniceus* in South African Museum.

The Dageraad is very rarely taken in Table Bay, but is frequent from False Bay eastwards.

The adult of this fish is easily recognised by its shape, which is roughly that of a right-angled triangle, the belly line forming the hypothenuse; and the sharp frontal ridge. Young specimens may be distinguished from specimens of *laticeps* of equal size by the narrower forehead, the indication of the frontal ridge, and as a rule the absence of the blue (or dark) band across the forehead.

The type of *puniceus* (250 mm.) is exactly similar to half-grown specimens from the Cape, which show clearly the transition from the ovate shape of the young to the triangular shape of the adult.

Pagrus laticeps (C. and V.).

Roman or Rooiman (Cape); *Daggerhead* (Natal).

1829. Cuvier, Règne Anim., ed. 2, Poiss., pl. xxxiv, fig. 2.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi. p. 122.

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 22 (*cristiceps* non C. and V.).

1861. *Id.*, *ibid.*, p. 22 (*algoensis*).

1866. Pappe, Syn. Ed. Fish. Cape, ed. 2, p. 13 (*cristiceps* non C. and V.).

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 234 (*pugicephalus*).

1914. *Id.*, Mar. Biol. Rep., vol. ii, p. 100 (*cristiceps* non C. and V.) (habits).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 362 (*pugicephalus*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 91 (*algoensis*) and p. 92 (*cristiceps* non C. and V.).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 19 (*pugicephalus* and *cristiceps* non C. and V.).

Profile of head sloping, nearly straight, no sharp frontal ridge; forehead very broad. Depth $2\frac{1}{4}$–$2\frac{1}{2}$, length of head $2\frac{2}{3}$–3, in length of body. Eye $3\frac{3}{4}$–$4\frac{1}{2}$ in length of head, $1\frac{1}{3}$–$1\frac{2}{3}$ in snout, $1\frac{1}{3}$ in interorbital width, slightly less than depth of preorbital. Interorbital slightly convex. Preorbital longer than deep, not reaching down to angle of mouth, lower margin straight. Gill-rakers 10 on lower part of anterior arch. Four canines in upper, 4–6 in lower jaw, outermost molars always the largest, 3–4 or 5 inner series in upper, 2–3 in lower jaw. D XII 10 (exceptionally XI 11), 4th or 4th and 5th spines longest. A III 8(7–9), 2nd and 3rd spines subequal in length, 2nd stouter. Scales: l.l. 59–61; l.tr. $\frac{9\text{–}10}{19\text{–}21}$; 12–15 series on cheek; limb of preopercle scaly.

Length.—Up to 500 mm.

Colour.—Brilliant orange-red, deeper above and paler below, head more orange; a silvery whitish patch on side of body; an azure-blue band between the eyes (usually persisting in preserved specimens as a dark band); axil of pectoral more or less dark; sometimes a dark spot at base of last dorsal ray (more noticeable in preserved than in living specimens); fins rosy; ventrals and often soft dorsal and anal violaceous. In the young the silvery-white patch on the side is usually much larger than in the adult.

Locality.—False Bay to Algoa Bay, East London and Natal, down to 36 fathoms.

Distribution.—Zanzibar and Mauritius (Steindachner).

Type of *pugicephalus* in South African Museum.

The Roman is one of the most plentiful and best-known fishes

along the coast in False Bay. The Natal fish (*pugicephalus*) is indistinguishable.

Specimens are occasionally caught in which the ground colour is bluish-grey instead of red, but the whitish patch is present as in normally coloured specimens.

**Pagrus bifasciatus* (Forsk.).

1775. Forskal, Descr. Anim., p. 64.

1878–88. Day, Fish. India, p. 141, pl. xxxiv, fig. 5.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 193, pl. xx, fig. 5 (scale).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 360 (references).

Profile of head steeply inclined. Depth about 2, length of head a little less than 3, in length of body. Eye $4\frac{1}{2}$ in length of head, $1\frac{1}{2}$–2 in snout, $1\frac{1}{3}$ in interorbital width, about equal to depth of preorbital. Preorbital longer than deep, not reaching down to angle of mouth, its lower margin straight. Four to six incisors in each jaw, 4 series of molars in lower, 5 in upper jaw. D XI 12–15, 5th spine longest. A III 10–11, 2nd spine strongest. Scales : l.l. 48–50 ; l.tr. $\frac{7}{15}$. About 7 series on cheek.

Length.—Up to 375 mm.

Colour.—Silvery, with dark lines along each row of scales ; head with two black cross-bands, first through eye to angle of mouth, second from nape along margin of opercle ; a yellow band before eyes, snout black, dorsal, caudal and pectoral yellow ; dorsal spines black, soft dorsal with narrow black edge ; ventrals and anal blackish, the latter sometimes with a yellow band, or the last ray yellow.

Locality.—Zululand coast, Delagoa Bay.

Distribution.—East coast of Africa, Indian seas.

Pagrus berda (Forsk.).

River or Mud Bream (Natal).

1775. Forskal, Descr. Anim., p. 32.

1852. Peters, Mon. Berl. Ac., p. 681 (*vagus*).

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 30 (*Pagrus caffer*).

1878–88. Day, Fish. India, p. 140, pl. xxxiv, fig. 2, and pl. xxxv, fig. 2.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 170 (*robinsoni* and *estuarius*).

1915. Boulenger, Freshwater Fish. Afr., vol. iii, p. 132, fig. 96 (*vagus*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 361 (*hasta* references, and *estuarius*), and p. 362 (*robinsoni*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 93 (*vagus*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 236 (*robinsoni*).

Profile of head sloping, straight; profile of chin and throat also nearly straight and nearly horizontal. Depth 2–2½, length of head about 3, in length of body. Eye 4–5 in length of head, 1⅓–1½ in snout, 1–1½ in interorbital width, 1–1½ times the depth of preorbital. Preorbital much longer than deep, not reaching down to angle of mouth, lower margin straight, or in adults gently concave. Four to six canines in upper, 6–8 in lower jaw; molars in 4–5 series in upper, 3–4 in lower jaw, the inner series largest. Gill-rakers 9–10 on lower part of anterior arch. D XI 11–12, spines stout, 4th longest. A III 8–9; spines, especially 2nd, very strong. Scales: l.l. 43–46; l.tr. $\frac{5}{12–13}$; 5–6 series on cheek; limb of preopercle scaleless.

Length.—Up to 750 mm. (Day).

Colour.—Silvery grey, lighter or darker, the scales either dark at their bases or with dark edges; in lighter varieties a dark spot at beginning of lateral line, fins greyish or blackish; dorsal with a black margin, anal (in lighter varieties) with a dark band, ventrals light or blackish.

Locality.—Natal and Zululand coast, Delagoa Bay, mouth of Zambesi River.

Distribution.—East coast of Africa, Indian seas to East Indies, and probably Japan. Often entering estuaries and rivers, especially when young.

Types of *robinsoni* and *estuarius* in South African Museum.

The synonyms of this species are numerous. Jordan and Thompson (1912, Proc. U.S. Nat. Mus., vol. xli, p. 583, fig. 10) adopt the name *latus* Houttuyn 1782 for Japanese specimens, because they were not absolutely convinced of the identity of *latus* and *berda*. The two forms described by Gilchrist and Thompson are clearly synonymous with *vagus* Peters, the darker form (*robinsoni*) corresponding with *calamara*, which Day makes a colour variety of *berda*. The strong 2nd anal spine was noted by Castelnau in his description of *Pagrus caffer*.

It is possible that the variation in colour may be sexual, but the series in the South African Museum is not long enough to decide this point.

Gen. Pagellus C. and V.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 169.

Teeth in front of jaws in cardiform bands, the outer row larger than the inner rows, but without canines, passing gradually into the lateral molars, of which there are several series, the innermost series increasing in size posteriorly, transversely oval or oblong. Cheek scaly. Interorbital and limb of preopercle scaleless. Preorbital deep or shallow. Posterior nostril oval or slit-like.

Warm and temperate seas.

Three species described as belonging to this genus have not since been recognised with certainty. These are *afer* Pappe, *armatus* Cast., and *fascialis* Cast. The first has usually been identified with the Panga (*Pagrus laniarius*), though the dorsal fin formula is quite different. Castelnau describes *armatus* from a single specimen, which he says closely resembles *afer*, or at least a specimen which he somewhat doubtfully identifies with Pappe's species. He also doubts whether he is correct in assigning his *fascialis* to the present genus. But for the different fin formula *fascialis* is strongly reminiscent of a *Lethrinus*.

Under the circumstances these three species are omitted from the fauna-list.

Key to the South African species.

1. Free margin of scales rounded. Posterior nostril slit-like. With black cross-bars (at least in young).
   - *a.* Scales : l.l. 43–50 . . . . . *lithognathus.*
   - *b.* Scales : l.l. 60–65 . . . . . *mormyrus.*
2. Free margin of scales angular. Posterior nostril oval. Red, without cross-bars.
   - *a.* Anal rays 9. West coast . . . . . *erythrinus.*
   - *b.* Anal rays 10. South and east coasts . . . . *natalensis.*

Pagellus lithognathus C. and V.

White or River Steenbras.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 204, pl. cli.

1907. Schultze, Abh. Deutsch. Seefisch. Ver. Berl., vol. ix, p. 9, pl. i (after C. and V.).

1914. Gilchrist and Thompson, Mar. Biol. Rep., vol. ii, p. 99 (habits).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 363 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 90 (references).

Snout pointed, profile straight. Depth $2\frac{3}{4}$–3, length of head about 3, in length of body. Eye $3\frac{1}{2}$ (young)–6 (adult) in length of head, $1\frac{1}{5}$–$2\frac{1}{2}$ in snout, 1–2 in interorbital width, greater than (young) to $1\frac{1}{3}$ in depth of preorbital (from orbit to postero-inferior angle). Lips thick. Preorbital not entirely concealing maxilla, lower margin straight. Maxilla reaching to below anterior nostril, posterior end truncate; in adult thick, swollen, and very hard. Posterior nostril a narrow slit. Gill-rakers 13 on lower part of anterior arch. D XI 10, 4th and 5th spines longest. A III 8, 2nd and 3rd spines subequal or 2nd stronger. Scales with free margin rounded: l.l. 43–50; l.tr. $\frac{5}{14}$; 7 series on cheek.

Length.—Up to 1000 mm.

Colour.—Greyish or brownish, paler below, more or less silvery, especially in young; 5–7 dark vertical cross-bars which are distinct in young, but become obsolete in adult; fins greyish.

Locality.—Coast of South West Africa, Table Bay, False Bay, and Agulhas Bank to Natal.

The Steenbras is a well-known and valued food-fish. Apparently it frequents mud-banks, where it pokes about with its sharp snout in search of molluscs, crustacea, etc.

Pagellus mormyrus (Linn.).

Zee-basje; Zeverrim; Bontrok.

1758. Linné, Syst. Nat., ed. 10, p. 281.

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 54.

1916. Gilchrist, Mar. Biol. Rep., vol. iii, p. 6 (egg and larva).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 363 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 91 (references)

1919. Fowler, Proc. U.S. Nat. Mus., vol. lvi, p. 212 and 284.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 238.

Snout moderately pointed, not so much as in *lithognathus*, profile gently convex, often slightly gibbous in front of eyes. Depth $2\frac{2}{3}$–$2\frac{3}{4}$, length of head $2\frac{3}{4}$–3, in length of body. Eye 4 (young)–$6\frac{3}{4}$ (adult) in length of head, 2–3 in snout, $1\frac{1}{3}$–2 in interorbital width, $1\frac{1}{3}$–2 in depth

of preorbital. Lips not very thick. Preorbital with straight lower margin, entirely concealing maxilla except its hind apex, which is pointed. Posterior nostril slit-like. Gill-rakers long, 16–17 on lower part of anterior arch. D XI 12, 3rd and 4th spines longest. A III 10, 2nd and 3rd spines about equal. Scales with free margin rounded: l.l. 60–65; l.tr. $\frac{6-7}{13-15}$; 5 series on cheek.

Length.—Up to 400 mm.

Colour.—Silvery, with 10–14 dark vertical cross-bars, usually alternately longer and shorter; fins greyish or pale.

Locality.—Mossamedes, Saldanha Bay, Table Bay, False Bay to East London, Natal and Zululand coast, and Delagoa Bay.

Distribution.—Mediterranean, west coast of Africa, West Indies, and Atlantic coast of tropical S. America.

**Pagellus erythrinus* (Linn.).

1766, Linné, Syst. Nat., vol. i, p. 469.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 170, pl. cl.

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 54.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 89 (references).

Snout moderately pointed, profile nearly straight. Depth 3, length of head $3\frac{1}{3}$, in length of body. Eye $4\frac{1}{3}$ in length of head, $1\frac{2}{3}$ in snout, about equal to depth of preorbital. Lips not thick. Preorbital with slightly concave lower margin, not entirely concealing maxilla, hind apex of which is rounded-truncate. Posterior nostril oval, scarcely larger than anterior one. D XII 10, 3rd and 4th spines longest. A III 9, 2nd and 3rd spines subequal. Scales with free margin angular: l.l. 60; l.tr. $\frac{6-7}{16}$; 6 series on cheek.

Length.—Up to 525 mm.

Colour.—Carmine or rosy, silvery below, fins rosy.

Locality.—Mossamedes.

Distribution.—Mediterranean, Canary Islands, and west coast of Africa.

Pagellus natalensis Stndnr.

Rooi Chor-chor.

1859. Günther, Cat. Fish. Brit. Mus., vol. i, pp. 474, 475 (*erythrinus* var. or sp. n.).

1887. Boulenger, Proc. Zool. Soc. Lond., p. 659 (*affinis* part).

1902. Steindachner, Denk. Ak. Wiss. Wien, vol. lxxi, p. 134.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 363 (*affinis* non Blgr.).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 89 (*affinis* non Blgr.).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 21.(*affinis* non Blgr.).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 238 (*affinis* non Blgr.).

Snout moderately pointed, profile gently convex, in adult rather gibbous in front of eyes. Depth $2\frac{2}{3}$–3, length of head $2\frac{3}{4}$–3, in length of body. Eye $3\frac{1}{3}$–4 in length of head, 1–$1\frac{1}{2}$ in snout, 1–$1\frac{1}{2}$ in interorbital width, $1\frac{1}{2}$ times depth of preorbital. Lips not thick. Preorbital with lower margin straight in young, sinuous in adult, not entirely concealing maxilla, hind apex of which is rounded-truncate. Posterior nostril oval, scarcely or very slightly larger than anterior one. Gill-rakers 11–12 on lower part of anterior arch. D XII 10, 4th spine longest. A III 10, 2nd spine slightly stronger than 3rd. Scales with free margin angular: l.l. 60–65; l.tr. $\frac{6\text{–}7}{16}$; 6 series on cheek, 6–7 across opercle.

Length.—Up to 350 mm.

Colour.—Carmine or rosy, silvery below; scales on upper part of body often with dark centres; fins rosy.

Locality.—Mossel Bay and Agulhas Bank to Natal and Delagoa Bay, down to 75 fathoms.

Type in Vienna Museum.

Closely allied to *erythrinus*, but separated on account of the extra anal ray.

Steindachner in describing and figuring specimens of *affinis* Blgr. states that these specimens have 11 scales across the opercle, whereas *erythrinus* and his Natal specimens have only 6. As all the South African specimens which I have seen agree with Steindachner's statement, it seems probable that Boulenger did not notice this difference in the two specimens, one from Muscat and one from the Cape, from which he drew up his diagnosis of *affinis*. As the Muscat specimen is clearly indicated as the type specimen, Steindachner's name is legitimately applied to the South African species if it is to be kept separate from *erythrinus*.

Gen. Charax Risso.

1827. Risso, Eur. Merid., vol. iii, p. 353.

A single series of trenchant incisor-like teeth in front of jaws, and of very small molars on the sides. Cheeks scaly. Posterior nostril oval.

One species.

**Charax puntazzo* (Gmel.).

Puntazzo (Mediterranean).

1788. Gmelin in Linn. Syst. Nat., p. 1272.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 72, pl. cxliv.

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 453.

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 19 (*capensis*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 93 (*capensis*).

Depth 2 or a little over, length of head 3 or a little over, in length of body. Eye about 2 in snout and $4\frac{1}{2}$ in length of head. Snout pointed. Teeth prominently projecting; 8–9 incisors in each jaw. Preorbital deeper than eye. D XI 13–14. A III 12. Scales: l.l. 55–60; 6–8 series above lateral line; about 5 series on cheek. Pyloric caeca 7.

Length.—Up to 500 mm.

Colour.—Silvery, with 5–9 narrow blackish vertical bands and a black blotch on each side of the caudal peduncle; dorsal, anal, and ventrals blackish, caudal yellowish, with blackish hind margin.

Locality.—Mossel Bay.

Distribution.—Mediterranean, Canary Islands.

There is a specimen in the British Museum, sent by Dr. Gilchrist from Mossel Bay. Castelnau states that his *capensis* had trifid molars and incisors apically tridentate.

The Puntazzo appears to be mainly a vegetable feeder.

Gen. Crenidens C. and V.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 377.

In both jaws two series of broad incisors, with crenulate edges, and behind them a band of granular molars. Cheeks scaly. Preorbital shallow. Posterior nostril a narrow slit.

Vegetable feeders from the east coast of Africa and Indian seas.

Crenidens forskalii C. and V.

White Karanteen.

1775. Forskal, Descr. Anim., p. 15 (*Sparus crenidens*).

1830. Cuvier and Valenciennes, *loc. cit.*, p. 377, pl. clxii quat.

1917. Gilchrist and Thompson, Ann. Durban. Mus., vol. i, pt. 4, p. 358 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 85 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 243 (*crenidens*).

Depth about $2\frac{1}{2}$, length of head $3\frac{2}{3}$ to nearly 4, in length of body. Eye $3\frac{1}{4}$–$3\frac{1}{2}$ in length of head, equal to or rather less than snout, 1 (young)–$1\frac{1}{2}$ in interorbital width. Depth of preorbital about $\frac{2}{3}$ eye-diameter. Ten to twelve incisors in each series. Gill-rakers 9–10 on lower part of anterior arch. D XI 11. A III 9–10. Scales: l.l. 55–59; l.tr. $\frac{6}{15–16}$; 3 series on cheek. Pyloric caeca 3.

Length.—Up to 240 mm.

Colour.—Silvery, greenish or bluish above, with narrow dark longitudinal stripes (at least in preserved specimens); dorsal and caudal greyish or greenish, with darker margins; anal and ventrals yellowish; a more or less distinct black spot in axil of pectoral.

Locality.—Natal coast, Delagoa Bay, Mozambique.

Distribution.—East coast of Africa, Red Sea, India.

C. indicus Day is very closely allied, but has only 8 incisors, and black dorsal and anal fins.

Gen. Boopsidea Cast.

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 25.

In both jaws a single series of 8–10 rather small but equal, sharply conical teeth in front, smaller and more granular ones at the sides, and behind the front teeth 2–3 series of small granular molars, the hindmost row being the largest. Cheeks scaly. Eye large. Posterior nostril oval.

An endemic South African genus with one species.

This genus seems worthy of maintenance on account of its general appearance, dentition, shallow preorbital, and large eye.

Boopsidea inornata Cast.

Fransch Madam.

1861. Castelnau, *loc. cit.*, p. 26.

1881. Steindachner, Ichthyol. Beitr., vol. x, p. 25, pl. ii (*Pagrus* (*Chrysophrys*) *holubi*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 88 (*Pagrus holubi*).

1918. *Id.*, *ibid.*, p. 94.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 236 (*Sparus holubi*).

Depth $2\frac{1}{4}$–$2\frac{1}{3}$, length of head $3\frac{1}{4}$–$3\frac{1}{2}$, in length of body. Eye $2\frac{2}{3}$ (adult)–3 in length of head, greater than snout, equal to (young) or greater than interorbital width, 3 times depth of preorbital. Lower margin of preorbital straight. Gill-rakers 16 on lower part of anterior arch, well developed. D XI 10–11, 4th spine longest, rather greater than eye-diameter. A III 11, spines strong. Scales minutely ctenoid : l.l. 63–68 ; l.tr. $\frac{8\text{–}9(10)}{18\text{–}20}$; 8–9 series on cheek. Limb of preopercle, interorbital, and snout scaleless. Pyloric caeca 4.

Length.—Up to 270 mm.

Colour.—Brown, with rosy or purplish reflections, silvery below ; a brownish band over the upper part of the opercle, and a more or less distinct dark spot in axil of pectoral ; iris yellow or golden, fins greyish, margin of spinous dorsal and ventrals blackish.

Locality.—False Bay and Agulhas Bank to East London, down to 33 fathoms.

Steindachner's *Pagrus* (*Chrysophrys*) *holubi* is clearly synonymous ; Castelnau's fish, though incompletely described as regards fin formula, etc., being easily recognisable.

The Fransch Madam (see Gilchrist, 1902, Tr. S. Afr. Phil. Soc., vol. xi, p. 219 for origin of name) is moderately common, and though of rather small size is considered good eating.

Gen. Dentex Cuv.

1817. Cuvier, Règne Anim., ed. 1, p. 272.

A row of sharp conical teeth in both jaws, the anterior ones (4–6) enlarged, canine-like, behind them several series of small, sharp teeth ; no molars. Cheek scaly. Preorbital usually deep. Posterior nostril oval or elongate oval, about equal to, or considerably larger than,

anterior nostril. Lateral line tubes simple, or with an ascending branch, or bifurcate.

Carnivorous fishes, often reaching a large size, inhabiting the warm regions of the Mediterranean, Eastern Atlantic, and Indo-Australasian Oceans. All valuable food-fishes.

In some species, e.g. *D. vulgaris*, and the South African *undulosus*, a large frontal gibbosity is developed in old males, similar to that in *Pagrus gibbiceps* (see Pellegrin, 1914, Ann. Inst. Ocean., vol. vi, p. 49, fig. 6).

D. macrocephalus Lacép., which has hitherto been included in the fauna-list, is here excluded, as even if it is identifiable, it is supposed to have come from the Indian Ocean or South Sea Islands. It seems that Thompson (1918), or perhaps Bleeker before him, has misread Cuvier and Valenciennes. These authors in their arrangement merely ranged *macrocephalus* "alongside of" the preceding species from the Cape, namely *rupestris*.

Key to the South African species.

I. Dorsal spines 10. Top of head naked. Limb of preopercle naked (*Gymnocranius*) . . . . . *robinsòni.*

II. Dorsal spines 11–12. Top of head scaly. Limb of preopercle scaly (*Dentex*).

A. Scales above lateral line distinctly smaller than those below.

1. D XI; 17–18 scales on cheek . . . . . *rupestris.*
2. D XII; 11–12 scales on cheek . . . . *praeorbitalis.*

B. Scales above lateral line not distinctly smaller than those below.

1. First 2 dorsal spines very short, 3rd elongate, more or less filamentously produced . . . . . *filosus.*
2. Dorsal spines graduated.

a. Depth of body about equal to length of head. Body elongate.

i. Eye 3½ or more in head. Top of head scaly as far as vertical from anterior nostril. . *argyrozona.*

ii. Eye 3 or less in head. Top of head scaly only as far as vertical from anterior margin of eye *macrophthalmus.*

b. Depth of body greater than length of head. Body shorter.

i. With 6 rows of dark dots . . . *lineopunctatus.*

ii. With 4–6 wavy blue (or dark) bands along sides and a black blotch below 6th dorsal spine . *undulosus.*

Dentex robinsoni G. and T.

1837. Rüppell, Neue Wirbelt. Fische, p. 116, pl. xxix, fig. 2 (*rivulatus* non Benn. 1835).

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 226.

1914. *Id.*, *ibid.*, vol. xiii, p. 68 (*rivulatus* Rüpp.).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 356 (*rivulatus* Rüpp., references) and p. 357.

Depth $2\frac{1}{4}$–$2\frac{2}{3}$, length of head 3, in length of body. Eye 3–$3\frac{1}{2}$ in length of head, slightly less than snout, 1–$1\frac{1}{4}$ in interorbital width, about equal to depth of preorbital. Canines 4–6, rather variable in size, as are the lateral teeth. Nostrils close together, the posterior one not elongate, scarcely larger than anterior one. D X 10–11, 4th and 5th spines longest, equal to postorbital part of head. A III 9–10. Scales: l.l. 45–49; l.tr. $\frac{6\text{–}7}{17\text{–}19}$; (4–)5 series on cheek; limb of preopercle scaleless; scaling on top of head not extending forwards beyond vertical from hind margin of eye.

Length.—Up to 400 mm.

Colour.—Silvery, greyish above; wavy blue lines across snout, cheek, and opercle; dorsal and anal fins rosy or yellowish, with deeper-coloured margin; caudal and pectoral pinkish, ventrals yellow.

Locality.—Natal coast.

Distribution.—Red Sea, Ceylon, Madagascar region.

Type of *robinsoni* in South African Museum.

D. robinsoni is the same as *rivulatus* Rüpp., but owing to the latter name being preoccupied by Bennett (1835, Proc. Zool. Soc., vol. iii, p. 91), Gilchrist and Thompson's name must be adopted for this well-known species.

The gills have been removed from the specimens in the South African Museum, so that the number of gill-rakers cannot be given.

Dentex rupestris C. and V.

Red Steenbras.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 231.

1849. Smith, Illust. Zool. S. Afr. Pisces, pl. xiv.

1853. Pappe, Syn. Ed. Fish. Cape, p. 21.

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 23 (*Chrysophrys laticeps* non C. and V.).

1869. Kner, Reise d. "Novara," Fische, p. 61, and p. 63 (*brevis*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 82 (*brevis* and *rupestris*).

Profile sloping, antorbital ridges prominent, especially in large examples. Depth about equal to length of head, a little less or a little

more than 3 in length of body. Eye 4 (young)–7 in length of head, $2\frac{1}{4}$–$2\frac{3}{4}$ in snout, $1\frac{1}{3}$–$1\frac{4}{5}$ in interorbital width, $1\frac{1}{2}$–2 in depth of preorbital. Preorbital almost as deep as long in adult. Canines strong. Gill-rakers short and stout, 8–9 on lower part of anterior arch. Posterior nostril oval. D XI 10(–11), spines moderate, 5th longest, $2\frac{1}{2}$–3 in length of head. A III 8, 2nd spine stronger, but shorter, than 3rd. Scales : l.l. 58–62 ; l.tr. $\frac{11}{18\text{–}20}$; 17–18 series on cheek ; limb of preopercle scaly ; scaling on top of head extending to vertical from posterior nostril. Scales above lateral line smaller than those below.

Length.—Up to 1500 mm. (5 ft.).

Colour.—Reddish or brownish, becoming paler, pinkish or orange or whitish below ; back with bluish, greenish, or bronzy reflections ; jaws yellowish, a dark patch or band between the eyes, fins greyish or reddish, ventrals pale, axil of pectoral often dark.

Locality.—Table Bay, False Bay, and Agulhas Bank to Natal.

The specimen recorded by Fowler (1925, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 239) as *rupestris* is certainly not this species. I am inclined to think it should be referred to *filosus*, but as the description, while giving several details, misses the essential distinguishing characteristics (*e.g.* relative sizes of scales above and below lateral line, size of 1st 2 dorsal spines), one cannot be certain. I have never seen a specimen of *rupestris* with only 8 scales across the cheek, or 13 gill-rakers.

The Red Steenbras, though rare in Table Bay, is common in False Bay and on the Agulhas Bank. It seems to prefer the neighbourhood of rocks.

Dentex praeorbitalis Gnthr.

Scotchman.

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 368 (not figured).
1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 157.
1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 356.
1918. Thompson, Mar. Biol. Rep., vol. iv, p. 82.
1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 239.

Body and head compressed. Profile sloping, straight, nape convex, gibbous. Depth $2\frac{2}{3}$–$2\frac{4}{5}$, length of head 3–$3\frac{1}{4}$, in length of body. Eye $4\frac{2}{5}$–$6\frac{2}{3}$ in length of head, 2–$2\frac{1}{2}$ in snout, equal to or greater than interorbital width, $1\frac{1}{2}$–$1\frac{3}{4}$ in depth of preorbital. Preorbital deeper than long. Canines moderate to strong. Gill-rakers 17 on lower part of

anterior arch. Posterior nostril small, oval. D XII 10, 4th spine longest, about $\frac{2}{3}$ length of head. A III 8, spines moderate, 2nd and 3rd subequal. Scales : l.l. 59–62 ; l.tr. $\frac{9-11}{16-17}$; 11–12 series on cheek ; limb of preopercle scaly ; scaling on top of head extending to vertical from nostrils. Scales above lateral line much smaller than those below.

Length.—Up to 500 mm.

Colour (as preserved).—Greyish or reddish, each scale above lateral line with a dark centre, forming more or less regular oblique lines of dark dots ; upper and lower margins of orbit and a bar across inter-orbital, and a band along base of dorsal fin dark ; fins pale.

In life, dark yellow, with a blue band along base of dorsal and blue dots on body, those below larger and paler than those above lateral line, fins yellowish with mauve or violet tints, a blue streak above and at side of eye (from Marley's colour-notes, quoted by Fowler).

Locality.—Natal coast, down to 40 fathoms.

Type (stuffed specimen) in British Museum.

This species is easily recognised by its long and narrow " face " as seen from in front, the deep preorbital, and the marked difference in size of scales above and below the lateral line.

Fowler correctly gives 11–12 series of scales across the cheek, and then proceeds to say that there are 16 in his specimen.

Dentex filosus Val.

Witte-vis (Cape) ; *Soldier* (Natal).

1836. Valenciennes in Webb and Berthelot, Iles Canar. Poiss., p. 37, pl. vi (*filamentosus* on plate, non C. and V.).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 155 *miles*).

1914. *Id.*, Mar. Biol. Rep., vol. ii, p. 128, fig. (*albus*).

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 50.

1916. Gilchrist, Mar. Biol. Rep., vol. iii, p. 3 (*albus*) (egg).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 356 (*filosus*, references, and *miles*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 82 (references).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 22 (*miles*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 240 (*miles*).

? 1925. *Id.*, *ibid.*, p. 239 (*rupestris* non C. and V.).

Depth $2\frac{1}{4}$–$2\frac{2}{3}$, length of head 3–$3\frac{1}{2}$, in length of body. Eye

$3\frac{1}{2}$ (young)–$4\frac{1}{2}$ in length of head, 1 (young)–$1\frac{3}{4}$ in snout, $\frac{4}{5}$ (adult) or equal to (young) interorbital width, greater than (young) or less than (adult) depth of preorbital. Canines 4 in upper, 6 in lower jaw. Gill-rakers 13–14 on lower part of anterior arch. Posterior nostril elongate, oval. D XII 10, spines flexible, except 1st 2 which are very short; 1st $\frac{1}{2}$ 2nd, which seldom exceeds $\frac{1}{2}$ eye-diameter; 3rd elongate, filamentous, at least $\frac{1}{2}$ length of head, a little shorter in adult (*albus*), up to $\frac{4}{5}$ length of head, but variable; 4th or 4th and 5th also somewhat filamentous, but shorter than 3rd, other spines successively shorter. A III 8, 2nd and 3rd subequal, 2nd usually slightly stronger than 3rd, which is usually slightly longer than 2nd. Ventral with 1st ray prolonged as a short filament, more pronounced in young and half-grown than in adult. Scales: l.l. 58–62; l.tr. $\frac{8}{15\text{–}16}$; 8(7–9) series on cheek; limb of preopercle more or less scaly, but scales often nearly obsolete; scaling on top of head extending forwards to vertical from anterior margin of eye or posterior nostril.

Length.—Up to 600 mm.

Colour.—Silvery pink, deeper above, whitish below; more or less distinct dark specks or cloudy patches on top of head, back, and at base of last dorsal ray; 4–5 pale blue longitudinal stripes, fading very rapidly after death; fins rosy, dorsal and tips of caudal lobes usually with narrow blackish margin, ventrals white; young (100 mm.) with 4 rather inconspicuous dark (as preserved) vertical cross-bars, the 1st across shoulder, the 4th from base of last dorsal ray.

Locality.—Mossamedes, Table Bay, Agulhas Bank to Natal, down to 70 fathoms.

Distribution.—Coast of Algiers and west coast of Africa, Canary Islands.

Types of *miles* and *albus* in South African Museum.

These types, and the specimen referred by Gilchrist and Thompson in 1911 (Ann. S. Afr. Mus., vol. xi, p. 32) to *filosus*, have been compared with a series from the Agulhas Bank and Natal and found to be identical.

The identification with *filosus* appears to be justified, though none of the South African specimens is as long in the body as represented by Valenciennes. It is probable that Valenciennes described from dried specimens (see footnote in Günther, Cat. Fish. Brit. Mus., vol. i, p. 449, regarding similar discrepancies in Valenciennes' description of *Diplodus cervinus*). Moreover, *filosus* has been recorded from various localities on the west coast as far south as Angola.

The 3rd dorsal spine is variable. Valenciennes records a specimen in which it measured half the total length.

The Witte-vis, so called because it is of a paler red than the Silver-fish and fades very rapidly, is rare in Table Bay, but frequent in the warmer waters of the Agulhas current.

Dentex argyrozona C. and V.

Silver-fish ; Kapenaar.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 235.
1849. Smith, Illustr. Zool. S. Afr. Pisces, pl. xix.
1861. Castelnau, Mem. Poiss. Afr. Austr., p. 30 (*macrodens*).
1916. Gilchrist, Mar. Biol. Rep., vol. iii, p. 3 (egg and larva).
1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 356.
1918. Thompson, Mar. Biol. Rep., vol. iv, p. 81 (references).
1919. Fowler, Proc. U.S. Nat. Mus., vol. lvi, p. 291.
1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 22.

Depth equal to length of head, 3 or a little less in length of body. Eye $3\frac{1}{2}$–$4\frac{2}{5}$ in length of head, equal to or slightly less than snout and interorbital width, twice or a little less than twice depth of preorbital. Preorbital 2–$2\frac{1}{2}$ times as long as deep. Canines strong, prominent, curved. Gill-rakers 18–20(21) on lower part of anterior arch. Posterior nostril oval. D XII 9–10, spines rather slender, 4th or 4th and 5th longest, $\frac{1}{3}$–$\frac{2}{5}$ length of head. A III 8, 2nd spine shorter than 3rd. Scales : l.l. 60–62 ; l.tr. $\frac{7–8}{17–19}$; 8–9 series on cheek ; limb of preopercle scaly ; scaling on top of head extending to vertical from anterior nostril.

Length.—Up to 750 mm.

Colour.—Silvery rose or pink, paler below, with several (4–6) brilliant silver longitudinal bands, fins rosy.

Locality.—Table Bay, False Bay, and Agulhas Bank to Algoa Bay and Natal, down to 70 fathoms.

One of the best-known and economically most important South African fishes.

**Dentex macrophthalmus* (Bl.).

1785. Bloch, Ichthyol., pl. cclxxii.
1801. Bloch Schneider, Syst. Nat., p. 337.
1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 227.

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 370.

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 50.

1919. Fowler, Proc. U.S. Nat. Mus., vol. lvi, p. 284.

Depth $2\frac{1}{4}$–$2\frac{2}{5}$, length of head $2\frac{3}{5}$–$2\frac{3}{4}$, in length of body. Eye less than 3 (Cuv. and Val.), $3\frac{1}{5}$–$3\frac{1}{2}$ (Fowler) in length of head, about equal to snout, greater than interorbital width. Preorbital shallow. Canines moderate. Gill-rakers 17–18 on lower part of anterior arch. D XII 10. A III 8, 2nd spine stronger and longer than 3rd. Scales: l.l. 58–60; l.tr. $\frac{6}{13}$; 7 series on cheek; limb of preopercle scaly; scaling on top of head not extending beyond vertical from anterior border of eye.

Length.—Up to 450 mm.

Colour.—Uniform red, silvery below.

Locality.—Mossamedes.

Distribution.—Mediterranean and neighbouring coasts of the Atlantic.

D. maroccanus C. and V., of which there is a specimen from Angola in the British Museum, is closely allied to this species. The distribution is the same, but *maroccanus* has a smaller eye and deeper preorbital (eye 4 in head, equal to depth of preorbital); l.l. 47; l.tr. $\frac{5}{12}$; 5–6 series on cheek.

D. cunninghamii Regan (1905, Ann. Mag. Nat. Hist., (7), vol. xv, p. 325), also from Angola, has eye $3\frac{1}{2}$ in length of head, depth of preorbital $\frac{2}{3}$ eye-diameter, 10 gill-rakers; D XII 10; A III 10; l.l. 60; l.tr. $\frac{6}{14}$; 6 series on cheek; 7(8) canines in upper, 11(12) in lower jaw.

Dentex lineopunctatus Blgr.

Blueskin.

1903. Boulenger, Ann. S. Afr. Mus., vol. iii, p. 66, pl. vi.

1908. Gilchrist and Thompson, *ibid.*, vol. vi, p. 156 (*natalensis*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 356 (*natalensis*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 240 (*natalensis*).

Depth $2\frac{1}{3}$–$2\frac{1}{2}$, length of head 3–$3\frac{1}{2}$, in length of body. Eye $3\frac{1}{2}$–4 in length of head, 1–$1\frac{1}{3}$ in snout, 1–$1\frac{1}{4}$ in interorbital width, slightly greater than depth of preorbital. Canines moderate to strong.

Posterior nostril elongate oval. D XII 10, spines moderately strong, 4th longest, $\frac{1}{2}$–$\frac{3}{5}$ length of head. A III 8, spines very strong, 2nd slightly longer than 3rd. Scales : l.l. 53–58 ; l.tr. $\frac{7}{17}$; 7–8 series on cheek ; limb of preopercle scaly ; scaling on top of head extending to vertical from anterior nostril.

Length.—Up to 350 mm.

Colour.—Pink or reddish, with a bluish tinge, with 6 rows, 3 above and 3 below the lateral line, of small purplish or bluish spots, some irregularly scattered spots on occiput and nape ; dorsal, anal, and ventral fins dark or violaceous.

Locality.—Natal coast, down to 40 fathoms.

Type in British Museum ; of *natalensis* in South African Museum.

The gills have been removed in all the specimens I have seen, but Fowler gives the number of gill-rakers as 13.

Dentex undulosus Regan.

Seventy-four.

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 28 (*rupestris* non C. and V.).

1908. Regan, Ann. Nat. Mus., vol. i, p. 252, pl. xl.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 357.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 83.

Profile prominently gibbose above the snout in some old specimens (? males only). Depth $2\frac{1}{2}$–3 or $3\frac{1}{6}$, length of head $3\frac{1}{5}$–$3\frac{4}{5}$, in length of body. Eye $3\frac{1}{2}$ (young)–$5\frac{4}{5}$ (adult) in length of head, 1 (young)–2 (adult) in snout, 1–2 in interorbital width, twice the depth of preorbital in young, $1\frac{1}{5}$ times in its depth in adult. Canines moderate to strong. Gill-rakers 14–16 on lower part of anterior arch. Posterior nostril elongate oval. D XII 10, 4th and 5th longest, equal to postorbital part of head. A III 9. Scales : l.l. 57–61 ; l.tr. $\frac{9\text{–}10}{18\text{–}20}$; 9–11 series on cheek ; limb of preopercle scaly (scattered scales in large examples) ; scaling on top of head extending forwards to above anterior nostril.

Length.—Up to 900 mm.

Colour.—Rose red shading to white on belly, with silvery, golden, and metallic blue, green, or violet reflections on back ; 4–6 irregularly

wavy, narrow, longitudinal, cobalt or ultramarine blue streaks, the uppermost along the base of dorsal fin, each streak bordered above and below (the uppermost one bordered below only) with pink, a cloudy blackish blotch on lateral line below about 6th dorsal spine ; dorsal greyish or violaceous, anal pale bluish, caudal and pectoral rosy, ventrals whitish. In preserved specimens the streaks become dark, with more or less distinct light borders.



Fig. 26.—Outline of head of a specimen of *Dentex undulosus*, 800 mm. in length, showing frontal gibbosity and forward limit of scaling (diagrammatic).

Locality.—Table Bay, False Bay, and Agulhas Bank to Natal.

Type in British Museum.

The Seventy-four, supposed to derive its name from the resemblance of the streaks along the sides to the rows of guns on an old man-of-war, or because one was once caught from such a vessel of 74 guns (see Gilchrist, 1902, Tr. S. Afr. Phil. Soc., vol. xi, p. 221), is rarely caught in Table Bay, but is abundant on the Agulhas Bank.

The beautiful coloration of this fish is not so vivid in life as shortly after death, when the colours appear in all their brilliance.

Gen. Caranthus nom. nov.

1817. Cuvier, Règne Anim., p. 278. (*Cantharus*, nom. preocc. Bolten 1798, and Montf. 1808.)

Teeth in front of jaws in broad cardiform bands, becoming narrower latterly, the outermost row largest, lanceolate, without canines or molars. Cheek scaly. Interorbital and limb of preopercle scaly or naked. Preorbital moderately deep or shallow. Posterior nostril more or less slit-like. The tubes of the lateral line short, often appearing bifurcate owing to there being two divergent series of pores opening to the exterior ; in *microlepis* there is only a pair of pores, being the two terminal pores in the divergent series found in other species.

Vegetable feeders inhabiting the Mediterranean and west coast of Europe, and the west, south, and east coasts of Africa.

Key to the South African species.

1. Snout moderate, conical. Limb of preopercle scaleless.
   a. Lower margin of preorbital not notched . . . . . *blochi.*
   b. Lower margin of preorbital notched.
      i. Scales : l.l. 68–75 . . . . . *lineatus.*
      ii. Scales : l.l. 80–85 . . . . . *emarginatus.*
      iii. Scales : l.l. 90–95 . . . . . *microlepis.*
2. Snout short, blunt, pug-nosed . . . . . *aeneus.*

Caranthus blochi (C. and V.).

Hottentot ; Hangberger.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 339.
1860. Bleeker, Nat. Tydsch. Ned. Ind., vol. xxi, p. 59 (*castelnaui*).
1914. Gilchrist and Thompson, Mar. Biol. Rep., vol. ii, p. 94.
1916. Gilchrist, *ibid.*, vol. iii, p. 6 (egg).
1918. Thompson, *ibid.*, vol. iv, p. 84 (references).

Profile sloping, gently and nearly evenly convex. Depth about $2\frac{1}{3}$, length of head 3, in length of body. Eye $3\frac{1}{2}$ (young)–5 in length of head, 1 (young)–2 in snout, $1\frac{1}{4}$ (young)–$2\frac{1}{2}$ in interorbital width, $1\frac{1}{2}$ times (young) to a little over once (adult) in depth of preorbital. Preorbital not concealing hinder portion of maxilla, lower margin straight (or almost so). Gill-rakers 13–14 on lower part of anterior arch. Outer row of teeth considerably larger than the succeeding inner series. D X 11–12, spines stout, 4th or 4th and 5th longest, 3 (or sometimes 4) in length of head, 1st ray longer than last spine. A III 10. Scales : l.l. 64–69; l.tr. $\frac{9\text{–}10}{18\text{–}20}$. Lateral line tubes bifurcate, especially anteriorly ; (8–)9 series on cheek ; limb of preopercle scaleless ; scaling on top of head not extending forwards beyond vertical from posterior third or centre of eye.

Length.—Up to 450 mm.

Colour.—Uniform greyish, brownish, sometimes bronzy or bluish, sometimes lighter, sometimes darker, usually lighter or silvery below.

Locality.—Coast of South-west Africa, Saldanha Bay, Table Bay, False Bay, Agulhas Bank.

The number of dorsal spines seems to be constantly ten.

The Hottentot is one of the commonest Cape fishes, but is more abundant on the west coast than on the Agulhas Bank.

A single specimen in the South African Museum, 275 mm. long, agrees with *blochi* in all respects except the following : the teeth are

rather stronger than in similar-sized specimens of undoubted *blochi*, especially the inner series, the outer row not being so abruptly larger than the succeeding rows; the preorbital, though quite straight on lower margin, completely conceals the maxilla. The exact locality is not recorded, but the specimen is from the collection made by the s.s. " Pieter Faure."

**Caranthus lineatus* (Mont.).

1815. Montagu, Mem. Wern. Soc., vol. ii, p. 451, pl. xxiii.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 319, pl. clx (*vulgaris*), and p. 333 (*griseus*).

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 413.

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 51.

Profile sloping, evenly and gently convex. Depth about $2\frac{1}{2}$, length of head $3\frac{1}{3}$, in length of body. Eye about 4 in length of head, slightly less than snout, greater than depth of preorbital. Preorbital with lower margin more or less deeply notched, exposing maxilla. D XI 12, spines slender, 4th–6th longest, about half length of head, 1st ray not longer than last spine. A III 10. Scales: l.l. 68–75; l.tr. $\frac{9\text{–}10}{19}$; 6–7 series on cheek; limb of preopercle scaleless (in C. and V.'s figure); scaling on top of head not extending forward beyond vertical from centre of eye.

Length.—Up to 450 mm.

Colour.—Silvery grey, with numerous dark longitudinal streaks; dorsal and anal dark grey or violaceous, ventrals brown.

Locality.—Mossamedes.

Distribution.—Mediterranean, west coast of Europe and Africa, Canary Isles.

Caranthus emarginatus (C. and V.).

Steenje.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 338.

1914. Gilchrist and Thompson, Mar. Biol. Rep., vol. ii, p. 94 (habits).

1915. Clark, Sci. Res. " Scotia," vol. iv, p. 396 (*Scatharus graecus* non C. and V.).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 357.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 84 (references).

Profile nearly straight to above eye, then rising more or less abruptly to the rather strongly convex nape, at least in adult. A rather prominent bulge in adult in front of orbit. Depth $2\frac{1}{5}$ (adult)–$2\frac{1}{2}$ (young), length of head $3\frac{1}{3}$, in length of body. Eye $3\frac{1}{2}$–4 in length of head, slightly greater than (young) or about equal to snout, $1\frac{1}{5}$ (young)–$1\frac{1}{2}$ in interorbital width. Depth of preorbital about half eye-diameter, lower margin deeply notched, exposing the maxilla. Gill-rakers 15 on lower part of anterior arch. Teeth numerous and fine, the inner series very fine. D XI 12–13, spines slender, 4th or 5th longest, usually nearly half length of head, but sometimes only about one-third, 1st ray not longer than last spine. A III 10. Scales : l.l. 80–85 ; l.tr. $\frac{13}{22}$. Anterior tubes of lateral line bifurcate. Eight series on cheek ; limb of preopercle scaleless ; scaling on top of head not extending forward beyond vertical from centre of eye.

Length.—Up to 300 mm.

Colour.—Brownish, lighter or darker, with numerous narrow blue and yellow longitudinal streaks, back often with a bluish, bronzy, or violaceous sheen ; dorsal, anal, and ventrals greyish or violaceous ; axil of pectoral often dark.

Locality.—Saldanha Bay, Table Bay, False Bay to Algoa Bay.

Distribution.—Madagascar region (Sauvage, Hist. Nat. Madagasc. Poiss., p. 514, 1891).

The Steenje is rare in Table Bay, but frequent in the warmer waters to the east.

The specimen identified as *Scatharus graecus* is in the British Museum. It has a band of teeth and is therefore not a *Scatharus*. Clark suggests the possibility of a confusion of labels ; if such has occurred it must have occurred after Clark's identification, for the specimen which I examined at the British Museum labelled *Scatharus graecus* ex "Scotia" Expedition is certainly our ordinary Steenje.

Caranthus microlepis (G. and T.).

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 231.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 357.

1921. Regan, Ann. Mag. Nat. Hist., (9), vol. vii, p. 419 (*Pagellus microlepis*).

Profile sloping, gently and nearly evenly convex, but with a slight bulge in front of eyes. Depth $2\frac{1}{2}$–$2\frac{2}{3}$, length of head 3–$3\frac{1}{2}$, in length of body. Eye 3–$3\frac{1}{2}$ in length of head, equal to or a little greater than

snout, equal to or slightly less than interorbital width, $2\frac{1}{2}$ times depth of preorbital. Preorbital with lower margin notched, and except for a very small part at the notch, entirely concealing maxilla. Gill-rakers 16-17 on lower part of anterior arch. Teeth moderate, outer row distinctly larger than inner rows. D XI 11–12, spines slender, 4th longest, about half length of head, 1st ray a little longer than last spine. A III 10. Scales : l.l. 90–95 ; l.tr. $\frac{14-15}{22}$. Tubes of lateral line simple, but with a pair of pores showing on some, especially the anterior ones. Eight series on cheek, limb of preopercle scaleless ; scaling on top of head not extending further forward than vertical from posterior third of eye. The scales are frequently lobate or even pointed in the centre of the free margin, especially those on hinder part of body.

Length.—Up to 200 mm.

Colour (as preserved).—Greyish or brownish, with faint traces of lighter and darker longitudinal streaks, interorbital with a more or less distinct dark band, fins dark or blackish.

Locality.—Natal coast, down to 30 fathoms.

Type in South African Museum ; of *Pagellus microlepis* in British Museum.

Regan says that the inner teeth are obtusely conical or molariform. The largest of the present specimens has indications of similar blunt teeth, though in younger examples the teeth are all sharp. Nevertheless this species is certainly a *Caranthus*, as is shown also by the lateral line scales.

Caranthus aeneus (G. and T.).

Bronze Bream ; Blue or Natal Hottentot.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 166.
1908. *Id.*, *ibid.*, vol. vi, p. 167 (*natalensis*).
1909. *Id.*, *ibid.*, vol. vi, p. 231 (*simus*).
1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 357.

Profile gently convex, a rather prominent bulge in front of eyes, below which the snout is rather concave ; thus giving a characteristic pug-nosed appearance. Depth $2\frac{1}{4}$–$2\frac{1}{2}$, length of head $3\frac{1}{2}$–$3\frac{3}{4}$, in length of body. Eye $3\frac{1}{2}$ (young)–$4\frac{1}{3}$ in length of head, 1 (young)–$1\frac{1}{2}$ in snout, $1\frac{1}{3}$ (young) to nearly 2 in interorbital width. Depth of preorbital $1\frac{1}{3}$ (adult)–$1\frac{1}{2}$ (young) in eye-diameter. Preorbital with lower margin straight or slightly concave (not notched), not entirely concealing

maxilla. Gill-rakers 15 on lower part of anterior arch. Teeth moderate, outer row distinctly larger than the inner rows. D XI 11, spines moderately stout, 4th or 4th and 5th longest, about $\frac{1}{2}$, or sometimes not much more than $\frac{1}{3}$, length of head, 1st ray not longer than last spine. A III 10. Scales : l.l. 83–88 ; l.tr. $\frac{10}{20\text{–}22}$. Tubes of lateral line bifurcate, especially the anterior ones ; 10 series on cheek ; limb of preopercle scaly ; scaling on top of head extending forward to vertical from anterior margin of eye, or almost.

Length.—Up to 430 mm.

Colour.—Greyish or bronzy-brown, dark above, silvery below, with (as preserved) numerous pale longitudinal streaks ; dorsal, anal, and ventrals blackish or violaceous.

Locality.—Natal coast. At certain seasons extends as far westwards as False Bay, where it is known as the Blue Hottentot.

Types of *aeneus*, *natalensis*, and *simus* in South African Museum.

Examination of these types shows no differences ; the verbal differences in Gilchrist and Thompson's descriptions are due *e.g.* to the last dorsal or anal ray being counted as one on one occasion and two on another. *C. aeneus* has page precedence over *natalensis*.

The short, blunt, pug-nosed snout easily distinguishes this species from any of the others from these waters.

Gen. Tripterodon Playf.

1866. Playfair in Playfair and Günther, Fish. Zanz., p. 42.

Similar to *Caranthus*, but body much compressed and elevated, and teeth tricuspid instead of lanceolate. Tubes of the lateral line not described. Dorsal spines short, except 3rd–5th, which are produced.

A single species.

**Tripterodon orbis* Playf.

1866. Playfair, *loc. cit.*, p. 42, pl. vii, fig. 1.

1925. Fowler, Proc. Ac. Nat .Sci. Philad., vol. lxxvii, p. 242.

Upper profile strongly convex. Depth $1\frac{1}{2}$, length of head $3\frac{1}{4}$–$3\frac{3}{4}$, in length of body. Eye $3\frac{1}{2}$–$3\frac{2}{3}$ in length of head, $1\frac{1}{2}$–2 in snout, $1\frac{1}{3}$ in depth of preorbital. Teeth movable, 4 series in upper, 3–4 in lower jaw. Gill-rakers short, 10 on lower part of anterior arch. D IX 20, 1st and 2nd spines very short, 3rd–5th produced, about $\frac{1}{2}$ length of body. A III 16. Soft dorsal and anal scaly, their anterior portions

elevated. First ray of ventral produced in a filament reaching to anal. Caudal emarginate. Scales: l.l. 52; l.tr. $\frac{11}{28}$. (Fowler, counting at highest point of lateral line, gives l.l. 45; l.tr. $\frac{7}{12}$.)

Length.—Up to 300 mm.

Colour.—Silvery, darker above, with indistinct, dusky cross-bands and longitudinal streaks of silver along each row of scales.

Locality.—Delagoa Bay.

Distribution.—Zanzibar.

Gen. Box C. and V.

1817. Cuvier, Règne Anim., p. 270 (*Boops*).

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 346.

A single series of broad incisors in front of both jaws, those in upper jaw notched, those in lower pointed; no molars. Lateral line very distinct. Cheeks scaly. Preorbital shallow. Both nostrils minute, pore-like.

Vegetable feeders from the Mediterranean, West Indies, and African coast.

Box salpa (Linn.).

Bamboo-fish (Cape); *Striped Karanteen* (Natal).

1766. Linné, Syst. Nat., ed. 12, p. 470.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vi, p. 357, pl. clxii.

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 52.

1914. Gilchrist and Thompson, Mar. Biol. Rep., vol. ii, p. 96.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 357 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 85 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 243 (*Sarpa s.*).

Depth $2\frac{2}{3}$–3, length of head $3\frac{1}{2}$–4, in length of body. Eye $3\frac{1}{4}$–$3\frac{1}{2}$ in length of head, subequal to snout, 1 (young)–$1\frac{1}{2}$ in interorbital width. Depth of preorbital about $\frac{1}{2}$ eye-diameter. Gill-rakers 12–13 on lower part of anterior arch. D XI 14–15. A III 13–14. Scales: l.l. 73–78; l.tr. $\frac{6}{16\text{–}17}$. Five series on cheek. Pyloric caeca 3–4.

Length.—Up to 450 mm.

Colour.—Silvery, greenish or bluish above, with yellow or orange longitudinal stripes, a black spot in axil of pectoral, the groove (formed by large smooth scales) from upper angle of gill cleft to the occiput, and a similar groove on the temporal region often deep metallic prussian-blue, fins greyish, lateral line brownish.

Locality.—Mossamedes, Saldanha Bay, Table Bay, False Bay, and Agulhas Bank to Natal and Delagoa Bay.

Distribution.—Mediterranean, Canary Islands, N.W. and W. coast of Africa.

The Bamboo-fish, or Streepje and Mooi Nootje, as it is also called, is common in False Bay, less so in Table Bay. It is normally a vegetarian, but in captivity readily becomes a carnivore (Gilchrist and Thompson, 1914). As a food-fish it is not considered particularly good.

Gen. Gymnocrotaphus Gnthr.

1859. Günther, Cat. Fish. Brit. Mus., vol. i, p. 432.

In both jaws a single series of broad lanceolate incisors, behind which is a band of smaller cardiform teeth ; no molars. Cheeks scaleless. Soft dorsal and anal with basal scaly sheath ; greater part of caudal scaly. Gill-rakers short, especially in adult. Posterior nostril a narrow slit.

An endemic South African genus with one species.

Gymnocrotaphus curvidens Gnthr.

John Brown.

1859. Günther, *loc. cit.*, p. 432 (fig. not published).

1914. Gilchrist and Thompson, Mar. Biol. Rep., vol. ii, p. 92 (habits).

1916. Gilchrist, *ibid.*, vol. iii, p. 6 (eggs).

1918. Thompson, *ibid.*, vol. iv, p. 94.

Depth 2–2½, length of head 3⅓–3⅔, in length of body. Eye 4–4⅔ in length of head, 2–2⅔ in snout, 1½–2 in interorbital width, 1½–2 in depth of preorbital. Gill-rakers 8–9 on lower part of anterior arch, often reduced to 6 or 7 in adult. D X 12. A III 10. Scales minutely ctenoid : l.l. 65–67 ; l.tr. $\frac{(6)7}{(18)20\text{–}22}$. Pyloric caeca 3. (Plate XXIX, fig. 3.)

Length.—Up to 325 mm.

Colour.—Yellowish brown, darker above and often with a purplish tinge on head, iris blue, fins greyish.

Locality.—False Bay, extending along the coast to East London.

Type in British Museum.

A vegetable or omnivorous feeder which is common in False Bay, and is an excellent table fish. It seems to be rare, if not entirely absent, from the Agulhas Bank.

Fam. Cichlidae.

Body ovate, compressed, with moderate-sized, more or less ctenoid, or cycloid, scales. Mouth moderate or large, protractile. No subocular shelf. Teeth in jaws very variable; no vomerine or palatine teeth. A single nostril on each side. Gill-membranes free from isthmus. Gills 4, a slit behind 4th. No pseudobranchiae. A single dorsal fin. Anal spines 3–10. Ventrals thoracic, of a spine and 5 rays, with axillary process. Air-bladder present. Pyloric caeca few or none. Lateral line single, double, or triple.

A very large family of fishes living in fresh water or brackish water in Africa (including Madagascar), Syria, India and Ceylon, and tropical America.

The South African representatives are dealt with in Gilchrist and Thompson's "Freshwater Fishes of South Africa" (Ann. S. Afr. Mus., vol. xi, pt. 6, p. 475, 1917), based on Boulenger's "Catalogue of the Freshwater Fishes of Africa," vol. iii, 1915. Since then Regan has revised the admittedly unsatisfactory classification (Ann. Mag. Nat. Hist., (9), vol. v, p. 33, 1920, and *ibid.*, (9), vol. x, p. 249, 1922). The generic arrangement is quite different from that of Boulenger and Gilchrist and Thompson, and all but one of the 16 "new species" instituted by the latter collaborators are sunk as synonyms of previously described species.

Fam. 47. Amphiprionidae.

(=*Pomacentridae and Glyphisodontidae*).

1921. McCulloch, Mem. Queensl. Mus., vol. vii, p. 168 (key to genera).

Body ovate, usually short and deep, compressed, with rather large ctenoid scales. Mouth small. Maxilla more or less concealed under preorbital. Teeth in one or more series in jaws, conical or incisor-like; none on vomer or palatines. Lower pharyngeal bones com-

pletely united into one bone ; second upper pharyngeals distinct, 3rd and 4th united. A single nostril on each side. Gill-membranes free from isthmus. Gills $3\frac{1}{2}$. Pseudobranchiae present. Dorsal fin single, often notched, with numerous strong spines. Anal spines 2. Soft dorsal and anal more or less scaly. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal rounded, emarginate, or forked. Lateral line single, sometimes not extending to tail, or interrupted. Air-bladder present. Pyloric caeca few. Subocular shelf present.

Rather small, usually brilliantly coloured, carnivorous or herbivorous fishes of tropical and subtropical waters. They inhabit mostly coral-reefs and rocky shores, and resemble in form and mode of life the *Chaetodontidae*.

Notable for the single nostril on each side, a character shared by the *Cichlidae*, with which the present family is considered to have affinities.

As *Amphiprion* is the earliest genus, the family name should be in accordance.

Key to the South African genera.

1. Teeth conical, or villiform.
   - *a.* Opercle as well as preopercle and preorbital serrate . *Amphiprion.*
   - *b.* Opercle not, preopercle and sometimes preorbital serrate . *Dascyllus.*
   - *c.* None of opercular bones serrate . . . . . *Chromis.*
2. Teeth compressed, incisor-like.
   - *a.* Preopercle serrate . . . . . *Pomacentrus.*
   - *b.* Preopercle smooth . . . . . *Glyphisodon.*

Gen. Amphiprion Bl. Schn.

1801. Bloch Schneider, Syst. Ichth., pp. 47, 200.

Body short and deep. Scales in about 50 series. Lateral line ceasing below end of dorsal fin. Teeth fixed, small, conical, in a single series. Opercle, preopercle, and preorbital strongly serrate, but without strong spines. Dorsal spines 9–11.

**Amphiprion polymnus* (Linn.).

1758. Linné, Syst. Nat., ed. 10, vol. i, p. 291.

1801. Bloch Schneider, Syst. Ichth., p. 121, pl. cci, fig. 2 (*ephippium*).

1830. Bennett, Fish. Ceylon, p. 29 (*clarkii*).

1876–81. Günther, Fische d. Südsee, vol. ii, p. 224, pl. cxxii, figs. C, D (*ephippium*).

1878–88. Day, Fish. India, p. 378, pl. lxxx, figs. 1, 2 (*ephippium*, *frenatus*, and *clarkii*).

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 598 (references and synonymy).

Depth $1\frac{3}{4}$–$1\frac{4}{5}$, length of head $3\frac{1}{5}$–$3\frac{1}{4}$, in length of body. Eye $3\frac{1}{2}$–4 in length of head. D X–XI 15–17, scarcely notched. A II 14–15. Caudal more rounded in young than adult. Scales: l.ser. 50–55; l.tr. $\frac{7}{18–19}$.

Length.—Up to 150 mm.

Colour.—Variable, dirty yellow or brownish or reddish, the hinder half of body usually darker than front half, without any bands (*ephippium*), or with 1, 2, or 3 pearly, blue- or black-bordered cross-bars, the first from nape across opercle, second from middle of dorsal, third across caudal peduncle (when only 2 bars present the hindermost one is absent, when only one the foremost one persists); fins all black or all yellowish white, or variegated; in var. *clarkii* the dorsal and anal are black, the ventrals yellow.

Locality.—Mozambique.

Distribution.—Indo-Pacific to Japan and Australia.

Gen. Dascyllus Cuv.

1829. Cuvier, Règne Anim., ed. 2, p. 91 (non *Dascillus* Latr. 1796).

1849. Cantor, Malay Fish., p. 240 (*Tetradrachmum*).

Body short and deep. Scales in less than 30 series. Lateral line ceasing below soft dorsal. Teeth fixed, small, in a narrow villiform band, the outer row somewhat larger, conical. Preopercle and sometimes preorbital serrate, without strong spines. Dorsal spines 12–13 (17 in one species).

If *Dascyllus* is to be reckoned identical with *Dascillus*, Cantor's generic name must be used.

Key to the South African species.

1. Brown, a white spot on occiput, and another on lateral line below middle of dorsal; the spots more or less distinct . . . . *trimaculatus.*
2. Greyish or yellowish, each scale with a bluish streak . . *marginatus.*
3. Rosy, a faint dark cross-bar from origin of dorsal to pectoral . . *carneus.*

PLATE XXIX.

FIG.		TEXT-PAGE
1.	*Pagrus cristiceps* (C. and V.) (original photo)	700
2.	*Pagrus nasutus* (Cast.) (original photo)	695
3.	*Gymnocrotaphus curvidens* Gnthr. (original photo)	727
4.	*Thyrsites atun* (Euphr.) (after C. and V.)	789



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**Dascyllus trimaculatus* (Rüpp.).

Three-spot Coral-fish.

1828. Rüppell, Atl. Fische Roth. Meer., p. 39, pl. viii, fig. 3.

1877. Bleeker, Atl. Ichth., vol. ix, pl. cdix, fig. 8.

1888. Day, Fish. India Suppl., p. 801.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 266, fig. 112 (*albisella*).

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.

Depth $1\frac{1}{2}$, length of head $3\frac{1}{3}$–$3\frac{1}{2}$, in length of body. Eye $2\frac{1}{2}$–$2\frac{3}{4}$ in length of head. Preopercle and preorbital minutely serrate. D XII 13–15, scarcely notched, 2nd and 3rd spines subequal, $\frac{3}{5}$ length of head. A II 13–14. Scales : l.ser. 27 ; l.tr. $\frac{3}{11}$.

Length.—Up to 125 mm.

Colour.—Blackish or dark brown, a white spot on occiput and another on lateral line below middle of dorsal fin, these spots often indistinct ; fins dark, dorsal, anal, and caudal with blackish margins.

Locality.—Natal coast, Mozambique.

Distribution.—East coast of Africa, Indian seas to East Indies.

**Dascyllus marginatus* (Rüpp).

1828. Rüppell, Atl. Fische Roth. Meer., p. 38, pl. viii, fig. 2.

1851. Bleeker, Nat. Tyds. Ned. Ind., vol. ii, p. 247 (*xanthosoma*).

1866. Playfair and Günther, Fish. Zanz., p. 81.

1876–81. Günther, Fische d. Südsee, vol. ii, p. 237, pl. cxxiv, figs. C, D (*xanthosoma*).

1877. Bleeker, Atl. Ichth., vol. ix, pl. cdix, fig. 3 (*reticulatum*).

1878–88. Day, Fish. India, p. 381, pl. lxxix, fig. 7, and Suppl., p. 800.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 422 (synonymy).

Depth $1\frac{1}{2}$, length of head 3, in length of body. Eye 2–$2\frac{1}{2}$ in length of head. D XII 14–16, not notched, 2nd spine sometimes higher than 3rd (Günther, *xanthosoma*). A II 12–13. Scales : l.ser. 25–26 ; l.tr. $\frac{3}{12}$.

Length.—Up to 75 mm.

Colour.—Greyish or yellowish, often with a dark band from origin of dorsal to pectoral fin, each scale with a bluish streak ; fins dark, spinous dorsal and margin of soft dorsal black.

Locality.—Ibo (Mozambique coast).
Distribution.—Indo-Pacific.

**Dascyllus carneus* Fischer.

1885. Fischer, Jahrb. Hamb. Wiss. Anst., vol. ii, p. 71, pl. ii, fig. 5.

Depth $1\frac{2}{5}$, length of head $3\frac{1}{2}$, in length of body. Eye $2\frac{1}{2}$ in length of head. D XII 16, slightly notched. A II 12. Scales: l.ser. 27; l.tr. $\frac{3(4)}{11}$.

Length.—Up to 80 mm.

Colour.—Rosy, flesh colour; a dark, more or less faint, cross-band from nape through pectoral to ventrals, and a second, less conspicuous, from soft dorsal to anal; spinous dorsal, anal, and ventrals black, caudal and pectorals yellow.

Locality.—Mozambique.

Closely allied to *xanthosoma* (=*marginatus*), but with a different ground colour, and the cross-band in front extending to the ventrals.

Gen. Chromis C. and V.

1815. Cuvier, Mem. Mus. d'Hist. Nat.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 493 (*Heliases*).

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 60 (*Heliastes*).

1918. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxx, p. 66 (*Hoplochromis*).

Body oblong or ovate. Scales in 30 or fewer series. Lateral line ceasing below soft dorsal. Teeth fixed, small, conical, in 2 or more series, the outer row largest. Preopercle entire. Preorbital and suborbital adnate to cheek, without free hind margin. Dorsal spines 12–14. Caudal more or less deeply forked, the lobes acute or rounded.

**Chromis xanthurus* (Blkr.).

Yellow-tail Coral-fish.

1854. Bleeker, Nat. Tyds. Ned. Ind., vol. vi, p. 107.

1871. Klunzinger, Abh. Zool. Bot. Ges. Wien, vol. xxi, p. 529 (*dimidiatus*).

1876–81. Günther, Fische d. Südsee, vol. ii, p. 237, pl. cxxv, fig. E (*dimidiatus*).

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.

Depth 2, length of head $3\frac{1}{2}$, in length of body. Eye $2\frac{1}{2}$ in length of head. D XII 11–12. A II 11–12. Caudal lobes acute, more or less filamentous. First ray of ventral filamentously prolonged. Scales : l.ser. 28 ; l.tr. $\frac{2}{10}$.

Length.—Up to 60 mm.

Colour.—Front half or two-thirds of body dark brown, posterior half or third yellow or whitish ; dorsal and anal anteriorly dark, posteriorly light, caudal whitish, ventrals and pectorals blackish at base.

Locality.—Natal coast.

Distribution.—Red Sea, East Indies, South Pacific Islands.

Gen. Pomacentrus Lacép.

1803. Lacépède, Hist. Nat. Poiss., vol. iv, p. 508.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 600.

Body ovate or oblong. Scales in less than 30 series. Lateral line ceasing below soft dorsal. Teeth fixed, small, more or less compressed, the crowns entire or slightly emarginate or rounded, in one or two series. Preopercle and usually suborbital serrate ; no strong spines. Subopercle and interopercle entire. Dorsal spines 12–13, spinous portion more or less scaly like soft portion.

This genus has been split up into several subgenera by Bleeker, but it is unnecessary to detail these for purposes of identifying the South African species.

Key to the South African species.

1. Yellow, with 5 black cross-bars . . . . . *annulatus*.
2. No black cross-bars.
   - *a*. Brownish or olivaceous, a dark spot on upper side of caudal peduncle *tripunctatus*.
   - *b*. Yellow . . . . . *pavo*.
   - *c*. Violaceous, scales with blue centres, end of dorsal, anal, and caudal yellow *sindensis*.

Pomacentrus annulatus Peters.

Five-barred Coral-fish.

1855. Peters, Wiegm. Archiv., p. 265.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 18.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 257.

Depth $1\frac{2}{3}$–$1\frac{3}{4}$, length of head 3, in length of body. Eye 3 in length of head. Depth of preorbital $2\frac{1}{2}$ in eye-diameter. Gill-rakers 8–9 on lower part of anterior arch. Preopercle feebly serrated; preorbital and suborbital not serrated. Teeth subtruncate, uniserial. D XIII 12, middle spines longest. A II 12. Caudal emarginate, lobes rounded. Scales: l.ser. 26–27; l.tr. $\frac{2}{9-10}$. Snout, preorbital, and lower jaw scaleless. Two series on cheek.

Length.—Up to 70 mm. (S. Afr. Mus.).

Colour.—Whitish or yellowish, with 5 black cross-bars, the first through eye, last at base of caudal, the 3 middle ones extending on to dorsal fin, which is otherwise whitish, with narrow black margin on the membrane between spines; median line of snout and chin black, caudal and pectorals yellow, ventrals and hinder part of anal black.

Locality.—Delagoa Bay, Mozambique.

The South African Museum specimens were caught actually at the island of Mozambique.

**Pomacentrus tripunctatus* C. and V.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 421.

1830. *Id.*, *ibid.*, p. 428 (*trilineatus*).

1837. Rüppell, Neue Wirbelt. Fische, p. 127, pl. xxxi, fig. 3 (*biocellatus*).

1877. Bleeker, Atl. Ichth., vol. ix, pl. cdvi, figs. 1–6 (*trilineatus*).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 423 (*trilineatus*).

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 604 (references and synonymy).

Depth 2, length of head $3\frac{1}{3}$, in length of body. Eye 3–4 in length of head. Preopercle denticulate; preorbital with 1–2 strong teeth separated by a notch from the smaller ones on suborbital. D XIII 14–15. A II 14–16. Scales: l.ser. 25–28; l.tr. $\frac{3}{9}$. Snout naked. Three series on cheek.

Length.—Up to 130 mm.

Colour.—Brownish or olivaceous, each scale with 1–2 blue dots; fine blue lines on top of head; a dark or blue spot on opercle; a black, blue-edged spot on upper part of caudal peduncle, in young specimens a similar spot on soft dorsal fin; fins yellowish.

Locality.—Mozambique.

Distribution.—Indo-Pacific to Japan.

P. burroughi and *opisthostigma* Fowler (1918, Proc. Ac. Nat. Sci. Philad., vol. lxx, p. 48, fig. 19, and p. 51, fig. 20) appear to be very closely allied, if not synonymous with this species.

**Pomacentrus pavo* (Bl. Schn.).

1785. Bloch, Ichthyol., pl. cxcviii, fig. 1.

1801. Bloch Schneider, Syst. Ichth., p. 228.

1876–81. Günther, Fische d. Südsee, vol. ii, p. 227, pl. cxxiv, fig. E.

1877. Bleeker, Atl. Ichth., vol. ix, pl. cdviii, fig. 9.

Depth $2\frac{1}{4}$, length of head $3\frac{2}{3}$, in length of body. Eye 3 in length of head. Preopercle denticulate; preorbital and suborbital minutely denticulate. D XIII 13. A II 13–15. Scales: l.ser. 28–30; l.tr. $\frac{3}{9}$. Three series on cheek.

Length.—Up to 100 mm.

Colour.—Yellow, each scale on body with a vertical blue streak; scales on head and bases of fins with blue dots; fins yellow, a dark spot on opercle.

Locality.—Mozambique.

Distribution.—East coast of Africa, East Indies.

Pomacentrus sindensis (Day).

1873. Day, Sea Fisheries Rep., Append., p. cclxiii (*Glyphidodon s.*).

1878–88. *Id.*, Fish. India, p. 388, pl. lxxxii, fig. 2 (*Glyphidodon s.*).

1889. *Id.*, Fauna Ind. Fishes, vol. ii, p. 383 (*Pomacentrus s.*).

1916. Regan, Ann. Durb. Mus., vol. i, pt. 3, p. 169 (*Glyphidodon s.*).

1917. Gilchrist and Thompson, *ibid.*, vol. i, pt. 4, p. 376 (*Glyphidodon s.*).

Depth 2, length of head $3\frac{1}{3}$–$3\frac{1}{2}$, in length of body. Eye 3–$3\frac{1}{2}$ in length of head, greater than snout, less than interorbital width. Depth of preorbital 3 in eye-diameter. Gill-rakers 19–20 on lower part of anterior arch. Preopercle feebly serrated, sometimes only at angle. Preorbital and suborbital concealed under scales. Teeth truncate, or subtruncate, uniserial. D XIII 11–12, spines increasing slightly in length posteriorly. A II 11–13. Middle rays of soft dorsal somewhat produced. Caudal lobes somewhat pointed, especially the upper one in young. Scales: l.ser. 26–27; l.tr. $\frac{3}{10\text{–}11}$. Snout, preorbital, and lower jaw scaly. Five series on cheek. (Plate XXXII, fig. 3.)

Length.—Up to 125 mm.

Colour.—Violaceous, each scale on upper part of body and caudal peduncle with a light blue centre, some blue lines on head in young; fins dark, hind part of soft dorsal and anal and caudal yellow, ventrals black, pectoral pale, with dark spot in axil.

Locality.—Natal coast.

Distribution.—Indian seas.

Gen. Glyphisodon Lacép.

1775. Forskal, Descr. Anim., p. 59 (*Abudefduf*, a vernacular name, not intended for use in taxonomy).

1803. Lacépède, Hist. Nat. Poiss., vol. iv, p. 542.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 606.

Body short and deep. Scales in 30 or fewer series. Lateral line ceasing below soft dorsal. Teeth fixed, compressed, crowns notched, in a single series. Preopercle not serrate; preorbital and suborbital not adnate to cheek, not serrate. Dorsal spines 12–13.

A large genus which has been subdivided into subgenera.

Key to the South African species.

I. Dorsal spines 13.
  A. More or less distinct dark cross-bands.
    1. Dorsal rays 12–13. Cross-bars distinct . . . *saxatilis.*
    2. Dorsal rays 14–16. Cross-bars indistinct. A black spot at base of last dorsal ray . . . . . *sordidus.*
  B. Uniform, bi-coloured, or variously marked.
    1. Dorsal rays 13–14.
      a. A black blotch on caudal peduncle . . . *sparoides.*
      b. Usually 2 black ocelli on soft dorsal . . *brownriggi.*
      c. More or less uniform . . . . . *sculptus.*
    2. Dorsal rays 11 . . . . . *fallax.*

II. Dorsal spines 12.
  A. Dorsal rays 15–16 . . . . . *leucozona.*
  B. Dorsal rays 18 . . . . . *florentulus.*

Glyphisodon saxatilis (Linn.).

Banded Coral-fish; Isibubu-lungwana (Zulu).

1758. Linné, Syst. Nat., ed. 10, p. 276.

1876–81. Günther, Fische d. Südsee, vol. ii, p. 229, pl. cxxvi, figs. A, B.

1877. Bleeker, Atl. Ichth., vol. ix, pl. cdviii, fig. 5.

1878–88. Day, Fish. India, p. 386, pl. lxxxiii, fig. 2 (*coelestinus*), and p. 387, pl. lxxxiii, fig. 3 (*bengalensis*).

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 608 (synonymy and references).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 272, fig. 116 (*abdominalis*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt 4, p. 375 (*coelestinus*) (references).

1913. Weber, Siboga Exp. Monogr., 57, p. 345.

Depth $1\frac{2}{3}$–$1\frac{3}{4}$, length of head 3–$3\frac{1}{2}$, in length of body. Eye $2\frac{2}{3}$–$3\frac{1}{2}$ in length of head, 1–$1\frac{1}{2}$ in interorbital width. Snout $\frac{2}{3}$–1, depth of preorbital 2 (adult)–3 (young) in eye-diameter. Teeth rather slender. Gill-rakers 17–18 on lower part of anterior arch. D XIII 12–13, 6th–8th and 13th spines longest, penultimate spine shorter than ultimate. A II 12–13. Middle dorsal and anal rays highest, the fins subquadrate. Caudal lobes pointed. Scales: l.ser. 28–30; l.tr. $\frac{4}{12}$; 3–4 series on cheek. Limb of preopercle, snout, and preorbital naked; suborbital scaly posteriorly.

Length.—Up to 200 mm.

Colour.—Silvery olive, with 5–6 blackish cross-bars which are usually narrower, or at least not broader, than the intervals; a black spot in axil of pectoral; fins usually light, dorsal with black edge, soft dorsal and anal more or less blackish, caudal often with a dark band along each lobe.

Locality.—Natal and Zululand coast.

Distribution.—Indo-Pacific to Japan and Australia.

The American species *marginatus* (Bl.) appears to be different, and to have been wrongly named *saxatilis*.

Glyphisodon sordidus (Forsk.).

Sordid Coral-fish.

1775. Forskal, Descr. Anim., p. 62.

1866. Günther in Playfair and Günther, Fish. Zanz., p. 83, pl. xi, fig. 1 (*adenensis*).

1877. Bleeker, Atl. Ichth., vol. ix, pl. cdx, fig. 5.

1878–88. Day, Fish. India, p. 385, pl. lxxxiii, fig. 1; p. 385, pl. lxxxiii, fig. 4 (*leucopleura*); and p. 386, pl. lxxxiii, fig. 5 (*notatus*).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 430.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 610 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 375 (*adenensis*), and p. 376 (references).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322 (*notatus*).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 23 (*leucopleura*).

Depth $1\frac{2}{3}$–$1\frac{3}{4}$, length of head $2\frac{2}{3}$–3, in length of body. Eye $2\frac{1}{2}$ (young) –$3\frac{1}{2}$ in length of head, 1–$1\frac{1}{2}$ in snout, 1–$1\frac{1}{2}$ in interorbital width. Depth of preorbital 3 (young)–$1\frac{1}{3}$ (adult) in eye-diameter. Teeth slender. Gill-rakers 13–15 on lower part of anterior arch. D XIII 14–16, 5th–7th spines longest. A II 14–16. Middle dorsal and anal rays highest, the fins rounded. Caudal lobes rounded. Scales : l.ser. 28 –29; l.tr. $\frac{4}{12\text{–}13}$; 3–4 series on cheek. Limb of preopercle, snout, and preorbital naked ; suborbital more or less scaly posteriorly.

Length.—Up to 230 mm.

Colour.—Silvery or yellowish olive, with 5 obscure, broad, dark vertical cross-bands, some irregular black spots on occiput and nape in adult, a black spot in axil of pectoral, and a conspicuous black spot on upper part of caudal peduncle in axil of soft dorsal ; fins dusky, ventrals usually blackish. The bands and spots may be very faint or absent, except the spot on caudal peduncle, which is always present.

Locality.—Natal and Zululand coast, Delagoa Bay.

Distribution.—Indo-Pacific to Japan.

G. leucopleura is based on young specimens, and *adenensis* on a dried skin in which most of the markings have evidently faded.

**Glyphisodon sparoides* C. and V.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 468, and p. 470 (*margariteus*).

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 44.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 432.

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.

Depth $1\frac{3}{4}$, length of head $3\frac{1}{2}$, in length of body. Eye $2\frac{2}{3}$ in length of head, equal to interorbital width, larger than snout. Teeth small, narrow. D XIII 13. A II 12. Scales : l.ser. 29–30 ; l.tr. $\frac{4}{11}$. Scaling on top of head extending almost to tip of snout.

Length.—Up to 143 mm.

Colour.—Silvery greyish or olivaceous, each scale sometimes with a silvery dot, a large black blotch on each side of caudal peduncle.

Locality.—Natal coast, Mozambique.

Distribution.—Mauritius, Fiji Islands.

**Glyphisodon brownriggi* Benn.

Brownrigg's Coral-fish.

1828. Bennett, J. W. Fish. Ceylon, p. 8, pl. viii.

1830. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. v, p. 481 (*antjerius*), and p. 482 (*biocellatus*).

1855. Bleeker, Nat. Tyds. Ned. Ind., vol. viii, p. 454 (*antjerius*).

1876–81. Günther, Fische d. Südsee, vol. ii, p. 232, pl. cxxvii (references and synonymy).

1877. Bleeker, Atl. Ichth., vol. ix, pl. cdx, fig. 2 (*antjerius*).

1878–88. Day, Fish. India, pp. 387, 801, pl. lxxxi, figs. 4, 5 (*antjerius*), and p. 388, pl. lxxxi, fig. 6 (*modestus*).

1913. Weber, Siboga Exp. Monogr., 57, p. 352.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322 (*antjerius*).

Depth $2\frac{1}{3}$–$2\frac{1}{2}$, length of head 3–$3\frac{1}{2}$, in length of body. Eye $2\frac{1}{2}$–$3\frac{1}{2}$ in length of head. Depth of preorbital $\frac{2}{3}$ (adult) eye-diameter. Teeth narrow, with a second smaller series within and alternating with the outer row. D XIII 13, spines increasing in length posteriorly. A II 12–14. Lobes of soft dorsal and anal rounded or subquadrate. Caudal lobes rounded. Scales : l.ser. 26–28; l.tr. $\frac{2}{9}$; 3 series on cheek. Limb of preopercle, preorbital, and snout naked; suborbital more or less scaly posteriorly.

Length.—Up to 120 mm.

Colour.—Very variable; brownish, olivaceous, or yellowish, bluish lines on head, more or less continued along base of dorsal; often a whitish vertical cross-band behind base of pectoral, or a whitish or bluish, black-edged longitudinal band along the back; 2 black, blue-edged ocelli on hinder portion of soft dorsal; sometimes only one ocellus, sometimes none at all.

Locality.—Natal coast.

Distribution.—Indo-Pacific.

The colour given above is more or less that of the form figured by Bleeker as *antjerius* C. and V., which presumably is that of the Natal specimen on which Norman based his record.

Günther (*loc. cit.*) gives a long list of synonyms for this very variable fish, and the list will probably be increased when a large amount of material has been compared.

**Glyphisodon sculptus* Peters.

1855. Peters, Wiegm. Archiv., p. 266.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 45.

Depth a little less than 2 in length of body. D XIII 14. A II 14. Scales : l.ser. 25 ; l.tr. 10–11.

Length.—Not given.

Colour.—Greenish above, silvery beneath.

Locality.—Mozambique.

Both this species and *fallax* are very imperfectly known.

**Glyphisodon fallax* Peters.

1855. Peters, Wiegm. Arch., p. 266.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 55.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 434 (descr. copied from Gnthr.).

Depth 2½ in length of body. Eye equal to snout. D XIII 11. A II 11. Middle rays of soft dorsal and anal and the caudal lobes more or less prolonged into filaments. Scales : l.ser. 28 ; l.tr. $\frac{2-3}{9}$; two series on cheek.

Length.—Up to 100 mm.

Colour.—Olivaceous, head and base of soft dorsal and anal dotted with bluish, dorsal and anal blackish, caudal and ventrals light.

Locality.—Mozambique.

**Glyphisodon florentulus* Gnthr.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 49.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

Depth a little less than 2 in length of body. Eye greater than snout, more than twice depth of preorbital. D XII 18. A II 15. Scales : l.ser. 25 ; l.tr. $\frac{3}{9}$.

Length.—40 mm.

Colour.—Reddish-olive, with scattered bluish-white ocelli edged with darker, a large black blotch on hind part of spinous dorsal, soft dorsal and anal grey, caudal yellow, ventrals black.

Locality.—Natal coast.

Distribution.—Indian Ocean.

Very closely allied to *leucozona*, but with a larger number of dorsal and anal rays.

Glyphisodon leucozona Blkr.

1859. Bleeker, Nat. Tyds. Ned. Ind., vol. xix, p. 338.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 49.

1871. Klunzinger, Abh. Zool. Bot. Ges. Wien, vol. xxi, p. 526 (*cingulum*).

1877. Bleeker, Atl. Ichth., vol. ix, pl. cdvii, fig. 2.

1913. Weber, Siboga Exp. Monogr., 57, p. 349.

1918. Regan, Ann. Durban Mus., vol. ii, pt. 2, p. 76.

Depth 2, length of head $3\frac{1}{3}$, in length of body. Eye 3 in length of head. Depth of preorbital $\frac{2}{3}$ eye-diameter. D XII 15–16, 5th–7th spines longest, last spine shorter than penultimate. A II 12–13. Caudal lobes rounded. Scales: l.ser. 29; l.tr. $\frac{3}{10}$ (Gnthr.) or $\frac{2}{12}$ (Klunz.)

Length.—Up to 90 mm.

Colour.—Brownish or greenish, with bluish dots on head and body, a whitish vertical cross-bar behind base of pectoral, a black, blue-edged ocellus on hinder part of spinous dorsal; fins yellowish, spinous dorsal and ventrals blackish, axil of pectoral dark.

Locality.—Natal coast.

Distribution.—Red Sea, Java.

A specimen, 115 mm. long, which appears to be this species, was described by the collector as being "dark olive, with the lobe of soft dorsal and upper lobe of caudal yellow, also an indistinct lateral (? vertical) band yellowish."

Fam. 48. Labridae.

Wrasses.

Body oblong or elongate, compressed, with usually large cycloid scales. Mouth protractile. Maxilla slipping under edge of preorbital, without supplementary bone. Teeth separate (except in the West

Indian *Clepticus*), conical or compressed, the anterior ones usually canine-like ; frequently also a posterior canine near angle of mouth ; none on vomer or palatines. Lower pharyngeal bones completely united into one bone, triangular or Y-shaped, with conical, granular, or molariform teeth ; 2nd upper pharyngeals united with 3rd and 4th, similarly toothed. Nostrils paired. Lips more or less thick, with longitudinal folds. Gill-membranes sometimes joined to isthmus. Gills $3\frac{1}{2}$. Pseudobranchiae present. Dorsal fin single, spinous portion usually long, spines rather slender. Anal spines 2–6. Ventrals thoracic, of a spine and 5 rays, with or without axillary process. Caudal rounded, truncate, or emarginate. Lateral line single, continuous or interrupted. Air-bladder present. No pyloric caeca. No subocular shelf.

A large family of partly herbivorous, but mostly carnivorous, fishes from tropical and temperate seas, especially abundant on rocky coasts and coral reefs. They are usually brilliantly coloured, and all are valued as food-fishes.

One of the European Wrasses has been observed to seek out a sleeping place at night and lie down on its side to rest (*cf.* the Trigger-fish).

Some Wrasses have demersal eggs, others pelagic eggs. In a few cases nests are built out of seaweed, etc. for the concealment and protection of the eggs and larval fishes.

In the identification of the species, too much reliance must not be placed on coloration, which is variable, and often differs in the young and adult of the same species (see McCulloch, 1913, Rec. Austr. Mus., vol. ix, p. 361).

Key to the South African genera.

I. Lateral line continuous.
  A. Lateral line evenly curved.
    1. Body elongate. Cheek naked . . . . . *Chilio.*
    2. Body not elongate. Cheek scaly.
      a. D XII 9–11 . . . . . *Lepidaplois.*
      b. D XIII 7 . . . . . *Anchichoerops.*
  B. Lateral line abruptly bent posteriorly.
    1. Dorsal spines IX(–XI).
      a. Body elongate. Scales small : l.l. 110–120 . *Hologymnosus.*
      b. Body moderately elongate. Scales moderately small : l.l. 45–55.
        i. Head scaly. Lower lip bilobed. Anal rays 10 *Labroides.*
        ii. Head naked. Lower lip not bilobed. Anal rays 12 *Coris.*

c. Body oblong. Scales large : l.l. 25–30.
i. Anterior canines well developed.
α. Preopercle entire . . . *Platyglossus.*
β. Preopercle serrate . . . *Pteragogus.*
ii. Anterior canines not developed . . *Stethojulis.*
2. Dorsal spines VIII.
a. Snout prolonged, tubular . . . . *Gomphosus.*
b. Snout not prolonged . . . . . *Thalassoma.*
II. Lateral line interrupted.
A. Scales large : l.l. 20–28.
1. Cheek and opercle with large scales . . . . *Chilinus.*
2. Cheek and opercle with more or less developed patches of small scales.
a. First two dorsal spines connected with others, though sometimes remote and somewhat elongate . *Hemipteronotus.*
b. First two dorsal spines elongate and entirely separate from rest of fin . . . . . *Iniistius.*
B. Scales small : l.l. 80–92 . . . . . *Cymolutes.*

Gen. Chilio Lac.

1803. Lacépède, Hist. Nat. Poiss., vol. iv, p. 432.

Body elongate, compressed. Scales moderate. Head, including cheek, entirely naked, except for a few rudimentary scales on opercle. Preopercle entire. Snout conical. Teeth uniserial, without anterior or posterior canines ; palate and floor of mouth behind teeth granular. Dorsal with 9 spines, without basal sheath. Caudal subtruncate. Lateral line continuous, evenly curved.

A single widely distributed species.

Chilio inermis (Forsk.).

Elongate Wrasse.

1775. Forskal, Descr. Anim., p. 34.

1862. Bleeker, Atl. Ichth., vol. i, p. 82, pl. xxxi, fig. 4.

1878–88. Day, Fish. India, p. 407, pl. lxxxviii, fig. 4.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 644.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol i, pt 4, p. 381 (references and synonymy).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 259.

Depth 6½–7, length of head 3–3⅓, in depth of body. Eye 2⅔ (young) –4 in snout, 7 (young)–10 in length of head. Gill-rakers 19–20 on lower part of anterior arch, the lower ones very slender. D IX 13–14. A III 11–12. Scales : l.l. 45–50.

Length.—Up to 400 mm.

Colour.—Brownish or olivaceous, whitish or bluish silvery below, a brownish lateral streak or series of spots, bluish or yellowish lines on head, each scale often with a blue centre, sometimes a reddish spot on middle of side ; fins yellowish or greenish, dorsal and anal mottled with pale blue.

Locality.—Natal coast, Delagoa Bay, Mozambique.

Distribution.—Indo-Pacific to Japan.

Gen. Lepidaplois Gill.

1862. Gill, Proc. Ac. Nat. Sci. Philad., p. 140.

1839. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xiii, p. 102 (*Cossyphus* non Fabr. 1792, non Duméril 1802).

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 260 (*Chaeropsodes*).

Body oblong, compressed. Scales moderate. Cheeks and opercles scaly. Preopercle usually finely serrate, at least in young. Snout moderately conical. Teeth uniserial, the anterior ones canine-like, the lateral ones more or less confluent into a sharp ridge ; palate and floor of mouth behind teeth granular ; posterior canine present. Dorsal with (11–)12 spines, 9–11 rays. Dorsal and anal with basal sheath. Soft dorsal and anal not produced or falcate. Caudal truncate or emarginate. Lateral line continuous, evenly curved.

Key to the South African species.

1. A black spot at base of pectoral . . . . . *axillaris.*
2. Three to five whitish spots on back . . . . . *diana.*
3. A black blotch below soft dorsal . . . . . *hirsutus.*

**Lepidaplois axillaris* (Benn.).

1831. Bennett, Proc. Zool. Soc. Lond., p. 166.

1876–81. Günther, Fische d. Südsee, vol. ii, p. 239, pl. cxxviii, fig. E.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 617.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 377 (references).

Depth 3–3½, length of head 3⅖–3⅗, in length of body. Eye 4–4½ in length of head, 1⅓–1⅔ in snout. Gill-rakers 8 on lower part of anterior arch. D XII 10. A III 12, 1st ventral ray prolonged. Scales : l.l. 30–32.

Length.—Up to 200 mm.

Colour.—Anterior third brick-red, middle third pink, posterior third orange ; boundary between red and pink oblique, between pink and orange vertical ; ventral surface greenish, spinous dorsal red, soft dorsal, anal, and pectoral yellow, caudal orange ; a black spot on anterior 3 dorsal spines, on anterior part of soft dorsal and anal, and another at base of pectoral.

Locality.—Natal coast.

Distribution.—East coast of Africa, Indian seas, South Pacific.

**Lepidaplois diana* (Lac.).

1802. Lacépède, Hist. Nat. Poiss., vol. iii, pp. 451, 522, pl. xxxii, fig. 1.

1862. Bleeker, Atl. Ichth., vol. i, p. 159, pl. xxxviii, fig. 1.

1878–88. Day, Fish. India, p. 392, pl. lxxxvii, fig. 3.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 258.

Depth a little over 3, length of head 3, in length of body. Eye 6 in length of head, 2 in snout. D XII 10. A III 10–12, 1st ventral ray not prolonged. Scales : l.l. 32–33.

Length.—Up to 200 mm.

Colour.—Deep brick-red anteriorly and above, paler behind and below, 3–5 yellowish or chalky-white spots (dark in preserved specimens) above lateral line, irregularly scattered black dots on upper part of caudal peduncle and base of soft dorsal, a small black spot at base of caudal fin ; fins reddish or yellowish, sometimes a black spot on ventral and 2 on anal fins.

Locality.—Natal coast, Mozambique.

Distribution.—Red Sea, Indian seas, East Indies.

Lepidaplois hirsutus (Lac.).

Black-spot Wrasse.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 429, pl. xx, fig. 1.

1802. *Id.*, *ibid.*, p. 438, pl. ix, fig. 3 (*macrourus*).

1802. *Id.*, *ibid.*, pp. 454, 526, pl. xxxi, fig. 2 (*bilunulatus*).

1839. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xiii, p. 141 (*albotaeniatus*).

1862. Bleeker, Atl. Ichth., vol. i, p. 160, pl. xxxviii, fig. 3 (*bilunulatus*).

1876–81. Günther, Fische d. Südsee, vol. ii, p. 240, pl. cxxix, fig. A, and pl. cxxx (adult and juv.) (*macrurus* and *bilunulatus*).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 278, pl. xxiv (*albotaeniatus*), and p. 280, pl. xxiii (*strophodes* juv.).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 197 (*nigromaculatus*).

1909. *Id.*, *ibid.*, p. 260 (*Chaeropsodes pictus*).

1911. *Id.*, *ibid.*, vol. xi, p. 46 (*macrurus*), and p. 47 (*nigromaculatus*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, pp. 377, 378 (*macrurus* and *nigromaculatus*).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322 (*bilunulatus*).

Depth about equal to length of head, 3 in length of body. Eye 4½ (young)–6 in length of head, 1½–2 in snout. Gill-rakers 13 on lower part of anterior arch, the lower ones very small. D XI–XII 10–12. A III 12. First ventral ray prolonged. Scales : l.l. 30–34.

Length.—Up to 530 mm.

Colour.—Brilliant red, rosy, sometimes very pale or yellowish, with yellow or red longitudinal streaks and lines on head and body, those on the head often brownish and variable in extent, usually a broad pale band across cheek and opercle, bordered above and below by a narrow or a broad brown band ; a large black blotch between soft dorsal and lateral line, sometimes extending on to upper part of caudal peduncle, usually extending on to soft dorsal only in young, where the blotch extends downwards to, or on to, the anal ; fins pinkish or yellow, a black spot on anterior part of spinous dorsal, sometimes extending along nearly whole spinous portion, sometimes a black marginal band on anal, and a blackish spot on upper distal margin of pectoral.

Locality.—Natal coast, Mozambique.

Distribution.—Indo-Pacific.

Types of *Cossyphus nigromaculatus* and *Chaeropsodes pictus* in South African Museum.

There seems little doubt that all the above " species " should be combined under one name. The extent of the black blotch is very variable, being usually greater in the young than adult. In the type of *nigromaculatus* the blotch does not touch the caudal peduncle, but extends to below the last dorsal spine and covers the whole of the scaly sheath at the base of the soft dorsal.

Anchichoerops n.g.

Very similar to *Choerops* Rüpp. and to *Lepidaplois*, resembling the latter in general shape, the profile being less steep and the snout less obtuse than in the former. Differs from both genera in the consider-

ably smaller scales (l.l. ca. 50, and 13–14 between l.l. and origin of dorsal) and the fin formula, which is D XIII 9, A III 10–11. No posterior canine tooth.

In other respects agreeing with *Lepidaplois* as defined above.

Anchichoerops natalensis (G. and T.).

Giant Wrasse.

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 259 (*Choerops n.*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 377.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 257 (*Lepidaplois n.*).

Depth of body equal to length of head, about $2\frac{3}{4}$ in length of body. Eye 7–8 in length of head, 3–$3\frac{1}{2}$ in snout, $2\frac{1}{3}$–$2\frac{3}{4}$ in depth of preorbital. Gill-rakers 11 on lower part of anterior arch. D XIII 9, 4th spine shortest, considerably shorter than first 3 spines, all the spines covered in thick fleshy skin, which projects beyond apex of spine, especially in the first 3 spines, which appear like a raised crest; membranes deeply incised. A III 10–11. Soft dorsal and anal scaly at base. Caudal subtruncate. Scales: l.l. 50–52; 13–14 between lateral line and origin of dorsal. Cheeks and opercles with subimbricate scales, but limb of preopercle naked. (Plate XXXII, fig. 2.)

Length.—Up to 750 mm.

Colour.—Reddish or brownish above, yellowish below, 3 bluish vertical bars on back and 3 longitudinal bluish stripes on side of belly; opercles and cheeks with numerous small bluish and yellowish spots, soft dorsal and anal reddish with bluish spots, caudal yellowish with bluish stripes or spots and a blue margin, pectoral with reddish and bluish streaks.

Locality.—Natal coast.

Type in South African Museum.

The original description contains several inaccuracies which have obscured the true characters of this fish. The type and two other smaller specimens all agree in the fin formula and number of scales.

This is the largest of the South African Wrasses.

Gen. Hologymnosus Lac.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 556.

Body rather elongate, compressed. Scales small (110–120 in l.l.).

Head entirely scaleless. Preopercle entire. Snout conical. Teeth uniserial, the anterior ones canine-like, posterior canine absent; palate and floor of mouth behind front teeth granular. Dorsal with 9 spines, without basal sheath. Caudal truncate or sinuous. Lateral line continuous, sharply bent posteriorly.

Hologymnosus semidiscus (Lac.).

Banded Wrasse.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, pp. 429, 473, pl. vi, fig. 2.

1802. *Id.*, *ibid.*, p. 429, pl. vi, fig. 3 (*doliatus*).

1802. *Id.*, *ibid.*, pp. 455, 526, pl. xxviii, fig. 3 (*annulatus*).

1802. *Id.*, *ibid.*, p. 556, pl. i, fig. 3 (*fasciatus*).

1862. Bleeker, Atl. Ichth., vol. i, p. 96, pl. xx, figs. 1, 2 (*fasciatus*).

1878–88. Day, Fish. India, pl. lxxxviii, fig. 5 (not descr. p. 408) (*annulatus*).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 462, pl. xlix, fig. 5 (*doliatus*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 382 (*annulatus*).

Depth 4–4$\frac{1}{3}$, length of head 3$\frac{1}{5}$–3$\frac{1}{3}$, in length of body. Eye 8–9 in length of head, 2$\frac{1}{2}$–3 in snout. Gill-rakers 15 on lower part of anterior arch. D IX 12, anterior spines not prolonged. A III 12. Scales: l.l. 115–125.

Length.—Up to 400 mm.

Colour.—Rosy, yellowish below, with numerous narrow yellow or dark brown, or blue edged with brown, vertical cross-bars; often a broad yellow or white cross-band behind the pectoral fin, bordered with brown or black in front and behind; yellowish or bluish irregular streaks on head, dorsal fin rosy or violaceous, usually with a semicircular white spot at base between each pair of spines and rays, anal yellowish or rosy, both dorsal and anal with blue or violet edging, caudal rosy or violaceous, with (typically) a crescent-shaped yellow band on hind margin.

Locality.—Natal coast.

Distribution.—Indian seas, East Indies.

H. oxyrhynchus Blkr., 76 mm. in length, with three dark longitudinal stripes, is probably the young of this species.

Gen. Labroides Blkr.

1851. Bleeker, Nat. Tyds. Ned. Ind., vol. ii, p. 249.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 118.

Body elongate-oblong, compressed. Scales rather small. Head with cheeks and opercles more or less scaly. Snout pointed. Teeth minute, forming a band, with 2 canines anteriorly in each jaw, posterior canine present. Lower lip bilobed. Preopercle entire. Dorsal spines 9. Dorsal and anal without basal scaly sheath. Caudal subtruncate. Lateral line continuous, bent posteriorly.

Labroides dimidiatus (C. and V.).

Paradise-fish or Sea-swallow.

1835. Rüppell, Neue Wirbelt. Fische, p. 7, pl. ii, fig. 2 (*latovittatus* non Lacép.).

1839. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xiii, p. 136.

1862. Bleeker, Atl. Ichth., vol. i, p. 155, pl. xliv, figs. 1, 2 (*latovittatus* and *paradiseus*).

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 548.

1876–81. Günther, Fische d. Südsee, vol. ii, p. 243.

1878–88. Day, Fish. India, p. 393, pl. lxxxvii, fig. 1.

1913. Weber, Siboga Exp. Monogr., 57, p. 363.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

Depth a little over 4, length of head 3 or a little more, in length of body. Eye $3\frac{1}{2}$ (young)–$5\frac{1}{2}$ in length of head. D IX 10–12. A III 10. Scales : l.l. 46–53.

Length.—Up to 115 mm.

Colour.—Blue or yellow, paler below, a black longitudinal band from snout through eye to end of caudal fin, narrow in front, gradually broadening posteriorly so as to occupy nearly the whole width of caudal peduncle and fin, but leaving the upper and lower rays blue or yellow ; a dark or blackish band along base of dorsal and of anal, the latter continued along lower surface of caudal peduncle and sometimes curving up on caudal fin to join the median lateral stripe ; sometimes a dark streak across base of pectoral. Young specimens are often almost entirely black, except for a light streak along back and the upper and lower caudal rays.

Locality.—Natal coast.

Distribution.—Indian seas, East Indies.

This little fish is at once distinguished by its colour pattern.

Although the caudal fin is not swallow-tailed, the light upper and lower rays catch the eye and give the appearance of a swallow-tail; whence one of the vernacular names.

In coloration this fish has an exact counterpart in *Aspidontus taeniatus* among the Blennies (p. 843). The resemblance is all the more remarkable because in both species there are two varieties, one with a dark stripe across the base of the pectoral, the other without. It would be premature to claim this as a case of mimicry until observations have been made on the habits of these two species and on the possible poisonous qualities of one or the other. It may be noted, however, that the Striped Blenny is a herbivore, whereas the Sea-swallow is a carnivore.

Gen. Coris Lac.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 96.

1861. Bleeker, Proc. Zool. Soc., p. 411 (*Hemicoris*).

Body oblong, compressed. Scales moderate (50–60 in l.l.). Head entirely scaleless. Preopercle entire. Snout more or less conical. Teeth uniserial, the anterior ones more or less canine-like, posterior canine present or absent; palate and floor of mouth behind front teeth granular. Dorsal with 9 spines, without basal sheath. Caudal rounded-truncate. Lateral line continuous, sharply bent posteriorly.

Key to the South African species.

1. No posterior canine. Yellow longitudinal stripes . . . *caudimacula.*
2. Posterior canine present. Broad dark cross-bars . . . . *multicolor.*

Coris caudimacula (Q. and G.).

1834. Quoy and Gaimard, Voy. Astrolabe, vol. iii, p. 710, pl. xv, fig. 2.

1862. Bleeker, Atl. Ichth., vol. i, p. 106, pl. xxxvi, fig. 2.

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 540.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 382 (references).

Depth a little less than length of head, not quite 4 in length of body. Eye $5\frac{1}{2}$ in length of head, $1\frac{1}{2}$ in snout. No posterior canine. D IX 12, 1st and 2nd spines slightly produced. A III 12. Scales: l.l. 50–53; l.tr. $\frac{4}{18}$.

Length.—Up to 140 mm.

Colour.—Reddish or violaceous, with 4 yellowish longitudinal stripes, the 2nd beginning on snout and passing through eye, the 3rd forms a characteristic crook-shaped bend on the opercular flap; blue or violaceous streaks on opercle; a large black spot at base of caudal; dorsal rosy, with 2 violet or blue streaks and a black spot on first 2 spines; anal rosy or violet at base, with blue streaks.

Locality.—Natal coast, Mozambique.

Distribution.—Mauritius, Java, Red Sea.

**Coris multicolor* (Rüpp.).

1835. Rüppell, Neue Wirbelt. Fische, p. 15, pl. iv, fig. 3.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 198.

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 541.

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.

Depth a little less than length of head, 4 in length of body. Eye $6\frac{1}{2}$ in length of head, not quite 2 in snout. Posterior canine present. D IX 12, 1st spine slightly prolonged. A III 12. Scales: l.l. 55; l.tr. $\frac{5}{20}$ (Klunzinger gives 50–51 and $\frac{3}{20}$).

Length.—Up to 150 mm.

Colour.—Brownish above, paler below, 6 broad brown cross-bars or oblong patches on back, a blue band from maxilla through eye along side, sometimes 2 additional streaks, irregular blue lines on opercle, a yellowish irregular longitudinal bar on side of belly; dorsal and anal greenish at base, the outer half rosy or lilac, with longitudinal blue or violet lines or spots; an irregular dark patch at base of caudal.

Locality.—Natal coast.

Distribution.—Red Sea, New Hebrides.

Differs from the preceding species only in colour and the presence of the posterior canine.

Gen. Platyglossus Klein.

1740. Klein, Pisc. Misc., vol. iv, p. 40.

1837. Rüppell, Neue Wirbelt. Fische, p. 16 (*Halichoeres*).

1862. Bleeker, Proc. Zool. Soc. Lond., pp. 411, 412, 413 (*Platyglossus, Halichoeres, Macropharyngodon, Guentheria, Hemitautoga*).

Body oblong, compressed. Scales large, those on thoracic region smaller than those on sides. Snout conical. Head naked or more or less scaly. Preopercle entire. Teeth uniserial, with or without

small granular teeth behind outer row ; 2–4 anterior ones canine-like ; posterior canine present. Dorsal spines 9. Dorsal and anal without, or with, a more or less developed basal sheath. Caudal rounded or subtruncate. Lateral line continuous, sharply bent posteriorly.

This rather large genus has been subdivided into several genera or subgenera.

Key to the South African species.

1. No scales on cheek.
   a. No scales on opercle . . . . . *pseudominiatus.*
   b. A few small scales on opercle . . . . . *scapularis.*
2. Two series of scales on cheek, and some large scales on opercle . *robinsoni.*

**Platyglossus pseudominiatus* Blkr.

1856. Bleeker, Act. Soc. Sc. Indo-Ned., vol. i, p. 63.

1862. *Id.*, Atl. Ichth., vol. i, p. 115, pl. xl, fig. 5.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 151.

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.

Depth about equal to length of head, about $3\frac{1}{3}$ in length of body. Eye $4\frac{1}{2}$ in length of head. Canines 4 in upper, 2 in lower jaw ; small granular teeth behind outer row. D IX 11. A III 11. No scaly basal sheath. Caudal subtruncate. Scales : l.l. 28. None on cheek or opercle.

Length.—Up to 74 mm.

Colour.—Rosy, paler below, most of the scales with dark centres, forming 3–4 cross-bands across the back ; 2–4 oblique whitish or yellowish streaks on side of belly ; a violet spot behind eye ; a red blue-edged band from snout below eye to opercle ; dorsal with purplish oblique lines and 2 black ocelli, one between first 2 spines, the other behind first ray ; anal with oblique rosy blue-edged streaks ; caudal with small red spots.

Locality.—Natal coast.

Distribution.—East Indies.

**Platyglossus scapularis* (Benn.).

1831. Bennett, Proc. Zool. Soc. Lond., p. 167.

1862. Bleeker, Atl. Ichth., vol. i, p. 137, pl. xxxii, fig. 2 (*Guentheria coeruleovittata*).

1878–88. Day, Fish. India, p. 400, pl. lxxxv, fig. 4.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 378 (references).

Depth about equal to length of head, about 3 in length of body. Eye about 6 in length of head. Canines 4 in upper, 2 in lower jaw; small granular teeth behind outer row. D IX 11. A III 11. Scaly sheath scarcely developed. First ventral ray prolonged. Caudal rounded. Scales: 25–27. None on cheek; a few small scales on upper part of opercle.

Length.—Up to 180 mm.

Colour.—Greenish, many of the scales with dark spots or streaks; a broad red blue-edged band from snout to eye, another irregularly curved from below eye to commencement of a broad brownish or violaceous or bluish band from shoulder to caudal; a red streak from axil of pectoral to belly; dorsal and anal fins with a green blue-edged band; caudal with reddish or violaceous more or less confluent cross-bars.

Locality.—Zululand coast, Mozambique.

Distribution.—Indian seas, East Indies.

Platyglossus robinsoni G. and T.

1914. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xiii, p. 86.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 378.

Depth about equal to length of head, about $3\frac{1}{2}$ in length of body. Eye 5 in length of head. Canines 2 (not 4) in upper and lower jaws; small granular teeth behind outer row. D IX 12. A III 12. No scaly basal sheath. First ventral ray prolonged. Caudal rounded, the uppermost ray slightly produced. Scales: l.l. 27–28; 2 series on cheek; whole of opercle with rather large scales.

Length.—Up to 160 mm.

Colour (as preserved).—Brown, 2 dark lines from mouth to eye, 1 across chin, 3 from angle of opercle curving upwards and backwards below eye to upper part of opercle; a black ocellus between 1st and 2nd dorsal spines; dorsal and anal with a series of dark semicircular spots along base (1 between each pair of spines or rays), and a dark light-edged band along middle; caudal with some dark, light-edged, irregular cross-bars.

Locality.—Natal coast.

Type in South African Museum.

The original description is inaccurate in some respects.

Gen. Peragogus Peters.

1855. Peters, Wiegm. Arch., p. 261.

1856. Bleeker, Act. Soc. Sc. Indo-Ned., vol. i, p. 52 (*Duymaeria*).

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 551 (*Duymaeria*).

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 623 (*Duymaeria*).

Body ovate-oblong, compressed. Scales large. Cheek and opercle scaly. Snout conical. Preopercle serrate. Teeth uniserial, the anterior ones canine-like, a few inner granular ones ; posterior canine present. Dorsal spines 9–11. Membranes of the anterior dorsal and anal spines more or less produced, more so in male than female. Uppermost dorsal and lowermost ventral scales produced so to form a basal sheath for the dorsal and anal fins. First ventral ray produced or not. Caudal rounded. Lateral line continuous, sharply bent posteriorly.

The genera *Duymaeria* and *Pteragogus* have been separated because of the difference in number of dorsal spines, and the presence or absence of a prolonged ventral ray. The latter character may well prove to be a sexual one, like the greater or less prolongation of the dorsal membranous lobes.

Key to the South African species.

1. Dorsal spines 10–11. First ventral ray prolonged (*Pteragogus*).
   a. Opercle with ocellus . . . . . *opercularis.*
   b. Opercle without ocellus . . . . . *taeniops.*
2. Dorsal spines 9. First ventral ray not prolonged (*Duymaeria*) *filamentosa.*

**Pteragogus opercularis* (Peters).

1855. Peters, Wiegm. Arch., p. 261 (*Cossyphus o.* non Guich.).

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 101.

1866. Playfair and Günther, Fish. Zanz., p. 87.

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 551.

Depth $3\frac{1}{3}$, length of head $3\frac{7}{8}$ in total length (incl. caudal). Eye $4\frac{1}{4}$–$4\frac{1}{2}$ in length of head. D XI 9–10, membranes between spines lobed. A III 9–10. First ventral ray twice as long as 2nd. Scales : l.l. 25.

Length.—Up to 100 mm.

Colour.—Reddish or olive-green or violaceous, with numerous black or white spots and specks, especially on forehead and lateral line ;

a large black yellow-edged ocellus on opercle, dorsal and anal yellowish, with blue wavy lines, a black blue-edged ocellus on each membrane behind 2nd–4th dorsal spines, ventrals yellow, caudal yellowish or rosy, spotted.

Locality.—Mozambique.

Distribution.—Zanzibar, Red Sea.

**Pteragogus taeniops* (Peters).

1855. Peters, *loc. cit.*, p. 262 (*Cossyphus t.*).

1862. Günther, *loc. cit.*, p. 102.

1866. Playfair and Günther, Fish. Zanz., p. 86.

Similar to *opercularis*, and probably only a variety thereof, differing chiefly in the absence of the opercular ocellus, and the presence of only one ocellus on the dorsal fin, between the 1st and 2nd spines.

Locality.—Mozambique.

Distribution.—Zanzibar.

Pteragogus (*Duymaeria*) *filamentosus* (Peters).

Thread-fin Wrasse.

1855. Peters, *loc. cit.*, p. 263 (*Cossyphus f.*).

1862. Günther, *loc. cit.*, p. 122.

1866. Playfair and Günther, Fish. Zanz., p. 88.

Depth $2\frac{1}{3}$, length of head 3, in length of body. Eye 5 in length of body. D IX 10–11, lobes of the membranes in male strongly produced, often as long as depth of body. A III 9–10, lobes of the membranes between the spines prolonged. Scales : l.l. 26.

Length.—Up to 135 mm.

Colour.—Greenish or greyish, marbled with faint darker patches, black dots on occiput and postorbital region, lateral line irregularly marked with black spots, fine vertical blue lines below eye, lobes of dorsal fin anteriorly blackish, those of anal pinkish, soft dorsal more or less mottled, anal yellowish, caudal yellow with dark dots.

Locality.—Delagoa Bay, Mozambique.

Bleeker (Atl. Ichth., vol. i, p. 79) refers to the possibility that this species may be the same as his *nematoptera*. There is also a very close resemblance between Playfair and Günther's description of their var. b. of *filamentosa* and Bleeker's figure of *enneacanthus* (Atl. Ichth., vol. i, pl. xxiii, fig. 4).

Fowler, (1925, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 258)

records *nematopterus* from Delagoa Bay, which further points to Bleeker's opinion being correct.

Gen. Stethojulis Gnthr.

1861. Günther, Ann. Mag. Nat. Hist., vol. viii, p. 386.
1862. *Id.*, Cat. Fish. Brit. Mus., vol. iv, p. 140.
1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 629.

Body oblong, compressed. Scales moderately large, those on thoracic region as large as or larger than those on side of body. Head naked. Preopercle entire. Teeth small, close-set, without anterior canines ; posterior canine present. Dorsal spines 9. First anal spine often very small. No basal scaly sheath to dorsal and anal. Caudal rounded or subtruncate. Lateral line continuous, sharply bent posteriorly.

The genus *Hinalea* Jord. and Jord. (1922, Mem. Carn. Mus., vol. x, p. 69) differs in the absence of the posterior canine tooth.

Key to the South African species.

1. With well-marked longitudinal reddish or violet stripes.
   a. Lowest stripe interrupted in middle, but continued further along to caudal. No black dot at base of caudal . . . . . *interrupta.*
   b. Lowest stripe ceasing altogether above origin of anal. A black dot at base of caudal . . . . . *renardi.*
2. With white or pale longitudinal stripes on belly and lower half of body *strigiventer.*
3. With series of dark dots along belly and lower half of body.
   a. Depth of body less than length of head. A dark streak above pectoral *kallosoma.*
   b. Depth of body equal to length of head. No dark streak above pectoral *phekadopleura.*

Stethojulis interrupta (Blkr.).

1851. Bleeker, Nat. Tyds. Ned. Ind., vol. ii, p. 252.
1862. *Id.*, Atl. Ichth., vol. i, p. 133, pl. xliv, fig. 4.
1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.
1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 259.

Depth $3\frac{2}{3}$–$3\frac{3}{4}$, length of head $3\frac{1}{4}$–$3\frac{1}{3}$, in length of body. Eye about 5 in length of head. D IX 11. A III 11. Scales : l.l. 27–28.

Length.—Up to 120 mm.

Colour.—Greenish, paler below, a reddish-violet stripe from upper part of snout through upper part of eye along base of dorsal to caudal,

a similar stripe from hind margin of eye to opercular flap, another from upper lip below eye to margin of opercle, continued at a lower level below root of pectoral to caudal, but interrupted in the middle of the flank; a triangular black patch at root of pectoral, dorsal rosy, with narrow blue margin, caudal orange, ventrals and anal yellowish, pectoral pale yellow or white.

Locality.—Natal coast, Delagoa Bay.

Distribution.—East Indies.

Stethojulis renardi (Blkr.).

1851. Bleeker, Nat. Tyds. Ned. Ind., vol. ii, p. 253.

1862. *Id.*, Atl. Ichth., vol. i, p. 132, pl. xliii, fig. 2.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 141.

1876–81. *Id.*, Fische d. Südsee, vol. ii, p. 256.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 629, fig. 5 (*psacas*).

Depth of body about equal to length of head, about 3 in length of body. Eye about $5\frac{1}{2}$ in length of head. D IX 11. A III 11. Scales: l.l. 27–29.

Length.—Up to 120 mm.

Colour.—Pale brown or olivaceous, paler below, a violet line from occiput along base of dorsal to end of fin, a similar line from snout through eye to base of caudal, with a tiny black spot above its termination (not very distinct in life), another similar line from upper lip below eye to axil of pectoral, and another, somewhat more reddish in tint, from below root of pectoral, disappearing above origin of anal; a triangular red patch at root of pectoral, one or two dull violaceous bars across interorbital, above which is a rather bright yellow stripe.

Locality.—Mozambique.

Distribution.—East coast of Africa, East Indies, Japan, South Pacific.

Typically marked examples are common in the shallow bays of the mainland, opposite the island of Mozambique. The short branch of the lateral stripe enclosing a dark spot on the opercular flap as described by Jordan and Snyder in *psacas* is also present in most examples.

**Stethojulis strigiventer* (Benn.).

1832. Bennett, Proc. Zool. Soc. Lond., p. 184.

1862. Bleeker, Atl. Ichth., vol. i, p. 135, pl. xliii, fig. 1.

1866. Playfair and Günther, Fish. Zanz., p. 92.

1878–88. Day, Fish. India, p. 397, pl. lxxxiv, fig. 7.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 631.

1913. Weber, Siboga Exp. Monogr., 57, p. 370.

Depth $3\frac{2}{3}$, length of head 3, in length of body. Eye about 5 in length of head. D IX 11. A III 11. Scales : l.l. 26–27.

Length.—Up to 108 mm.

Colour.—Dark olive-green or violaceous green, paler below, upper part of head and back more or less reticulated, 4–6 pale rosy, yellow, or white longitudinal bands along lower half of body, a dark bar from upper lip below eye to margin of opercle, bordered below with red or white or bluish, dividing the head into a dark upper and a pale lower half ; fins reddish, caudal barred, a small black spot on penultimate dorsal ray, and a small black blue-edged ocellus at base of caudal fin above lateral line.

Locality.—Mozambique.

Distribution.—Indo-Pacific to Japan and Northern Australia.

Stethojulis kallosoma (Blkr.).

1852. Bleeker, Nat. Tyds. Ned. Ind., vol. iii, p. 289.

1862. *Id.*, Atl. Ichth., vol. i, p. 134, pl. xliii, fig. 4.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 631, fig. 6 (*terina*).

1913. Weber, Siboga Exp. Monogr., 57, p. 369.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 259.

Depth $3\frac{1}{2}$–$3\frac{2}{3}$, length of head $3\frac{1}{4}$, in length of body. Eye about $4\frac{1}{2}$ in length of head. D IX 11. A III 11. Scales : 25–27.

Length.—Up to 125 mm.

Colour.—Olive-green or violaceous, upper part of head and back more or less spotted and reticulated ; a faint rosy stripe from eye along upper part of body to caudal (often absent) ; a pink stripe from upper lip below eye to margin of opercle, continued above pectoral by a black or violet, blue or white-edged streak which ceases at end of pectoral or above origin of anal ; several series of dark spots on side of belly and above anal ; dorsal streaked or spotted with blue or violet, other fins yellowish.

Locality.—Natal coast, Delagoa Bay.

Distribution.—East coast of Africa, East Indies.

It is very questionable whether this and *phekadopleura* are really distinct species.

**Stethojulis phekadopleura* (Blkr.).

1849. Bleeker, Verh. Batav. Gen., vol. xxii, p. 8.
1862. *Id.*, Atl. Ichth., vol. i, p. 134, pl. xliii, fig. 5.
1876–81. Günther, Fische d. Südsee, vol. ii, p. 255.
1913. Weber, Siboga Exp. Monogr., 57, p. 369.
1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

Depth about equal to length of head, about 3 in length of body. Eye about 4 in length of head. D IX 11. A III 11. Scales : l.l. 26.

Length.—Up to 110 mm.

Colour.—Greenish violaceous, paler below, upper part of head and back dotted and reticulated, a rosy longitudinal stripe from upper lip below eye to pectoral and continued, though less distinctly, to the caudal ; several rows of dark dots along side of belly and above anal, dorsal dotted with violet, other fins uniform orange or rosy.

Locality.—Natal coast.

Distribution.—East Indies, South Pacific.

Gen. Gomphosus Lac.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 100.

Body oblong, compressed. Scales moderate. Snout prolonged, tubular. Head scaleless. Preopercle entire. Teeth uniserial, canines small, no posterior canine. Dorsal spines 8. Dorsal and anal with basal sheath. Caudal truncate or more or less lunate. Lateral line continuous, sharply bent posteriorly.

Key to the South African species.

1. Violet, fins yellow . . . . . *coeruleus.*
2. Brownish, a dark stripe from snout through eye to opercle . . *varius.*

**Gomphosus coeruleus* Lac.

1802. Lacépède, *loc. cit.*, p. 101, pl. v, fig. 1 ; pl. vi, fig. 1.
1862. Bleeker, Atl. Ichth., vol. i, p. 86, pl. xxi, fig. 5.
1878–88. Day, Fish. India, p. 406, pl. lxxxviii, fig. 3.
1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 382 (references).

Depth $3\frac{1}{2}$–$3\frac{2}{3}$, length of head $2\frac{1}{3}$–$2\frac{1}{2}$, in length of body. Eye about 8 in length of head, 4 in snout. D VIII 13. A III 11. Caudal with lobes prolonged in adult. Scales : l.l. 28–29.

Length.—Up to 240 mm.

Colour.—Violet or bright green, vertical fins yellow, dorsal and anal with blue margins, upper and lower margins of caudal blue, ventrals yellowish.

Locality.—Natal coast.

Distribution.—Indian seas, Malay Archipelago.

**Gomphosus varius* Lac.

1802. Lacépède, *loc. cit.*, p. 104, pl. v, fig. 2.

1862. Bleeker, Atl. Ichth., vol. i, p. 87, pl. xxi, fig. 3 (*melanotus*).

1878–88. Day, Fish. India, p. 403, pl. lxxxvi, fig. 6 (*pectoralis*).

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 650.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 289, fig. 125.

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.

Depth $3\frac{3}{4}$–$3\frac{4}{5}$, length of head $2\frac{2}{3}$–$2\frac{3}{4}$, in length of body. Eye 7–9 in length of head, $3\frac{1}{2}$–4 in snout. D VIII 13. A III 11. Caudal truncate, lobes slightly produced in adult. Scales : l.l. 26–29.

Length.—Up to 230 mm.

Colour.—Brown or reddish, paler below, back and top of head dark reddish or brownish, each scale with a violet or dark basal spot, a dark band from snout through eye to opercle, often 2 dark stripes from behind eye, vertical fins brownish, dorsal and anal with a narrow black or transparent border, caudal with a similar but broader margin, pectorals yellow, ventrals whitish.

Locality.—Natal coast.

Distribution.—Indo-Pacific to Japan.

Gen. Thalassoma Swains.

1839. Swainson, Nat. Hist. Classif. Fishes, vol. ii, p. 224.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 179 (*Julis* part, not of Cuvier 1817).

Body oblong, moderately compressed. Scales large. Head scaleless. Preopercle entire. Snout pointed or moderately so. Teeth uniserial, the anterior ones canine-like ; palate and floor of mouth behind teeth granular ; no posterior canine. Dorsal spines 8. First anal spine very small. Soft dorsal and anal with a slight basal sheath. Caudal truncate or lunate, with the angles prolonged. Lateral line continuous, sharply bent posteriorly.

Key to the South African species.

1. With reddish longitudinal bands.
   a. A black spot between dorsal spines 1–3. No black vertical bars *purpureum.*
   b. A black spot anteriorly on anal. Black vertical bars . . *dorsale.*
2. Without reddish longitudinal bands.
   a. A more or less distinct vertical white band behind pectoral . *hebraicum.*
   b. Fine vertical red streaks. Middle of caudal yellow, lobes strongly produced *lunare.*
   c. Anterior and upper parts dark, hinder and lower parts light *commersoni.*

Thalassoma purpureum (Forsk.).

Purple or Window Wrasse.

1775. Forskal, Descr. Anim., p. 27.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 437 (*fuscus*).

1802. *Id.*, *ibid.*, pp. 454, 526 (*trilobatus*).

1838. Rüppell, Neue Wirbelt. Fische, p. 11, pl. iii, fig. 2 (*umbrostigma*).

1862. Bleeker, Versl. Ak. Wet. Amsterd., vol. xiii, p. 279 (*güntheri*).

1862. *Id.*, Atl. Ichth., vol. i, pp. 92, 93, 94, pl. xxxiv, figs. 1, 2, 3 (*umbrostigma*, *quadricolor*, *güntheri*).

1878–88. Day, Fish. India, p. 404, pl. lxxxvi, fig. 3.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 461 (*trilobata*).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 295 (*purpureum*), p. 299, pl. xxxiv (*fuscum*), and p. 300, fig. 129 (*umbrostigma*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, pp. 380, 381 (*purpureum* and *umbrostigma*) (references and synonymy).

1918. Thompson, Mar. Biol. Rep., vol. iv, pp. 97, 98 (*güntheri* and *purpureum*) (references).

Depth 3–3½, length of head 3¼–3⅔, in length of body. Eye 5–7 in length of head. Gill-rakers 14–15 on lower part of anterior arch, small and slender. D VIII 13. A III 11. Caudal truncate, or slightly sinuous, lobes shortly produced in adult. Scales: l.l. 27–29.

Length.—Up to 250 mm.

Colour.—Greenish, becoming bluish above and paler or yellowish below; head with pink, red, or dark spots and bands radiating from eye; 3–4 pale red, deep red, or violaceous longitudinal bands along sides, which frequently are connected one with another by narrow vertical stripes, thus dividing up the ground colour into regular series

of characteristic vertically-oblong patches ; dorsal fin green or bluish, with a black spot anteriorly, and a broad red or pink, blue-edged band, or the position of the colours may be reversed ; anal green or bluish, with a red or yellow basal band ; caudal green or bluish, with the membrane red or yellow ; posterior half of pectoral blackish.

Locality.—Natal and Zululand coast, Delagoa Bay, Mozambique.

Distribution.—Indo-Pacific.

Two colour varieties occur in South African waters : one with the characteristic rows of vertical green patches, and one in which the longitudinal red bands are not connected with transverse bars. The name Window Wrasse indicates the resemblance of the former variety to a large building with its rows of windows.

Weber (1913, Siboga Exp. Monogr., 57, pp. 378, 379) keeps *umbrostigma*, *purpurea*, and *güntheri* distinct ; the former on account of the supraopercular scaling, the two latter on account of constant differences in the colour pattern ; *güntheri* having only 2 longitudinal bands, and consequently only one row of " windows."

The supraopercular scaling seems to be a variable character.

**Thalassoma dorsale* (Q. and G.).

Black-back Wrasse.

1834. Quoy and Gaimard, Voy. Astrolabe, Zool., vol. iii, Poiss., p. 713, pl. xv, fig. 5.

1862. Bleeker, Atl. Ichth., vol. i, p. 94, pl. xxxiv, fig. 4.

1878–88. Day, Fish. India, p. 403, pl. lxxxv, fig. 7.

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.

Depth about equal to length of head, a little over 3 in length of body. Eye 4½–6 in length of head. D VIII 13. A III 11. Caudal truncate, the lobes slightly produced. Scales : l.l. 26–29.

Length.—Up to 200 mm.

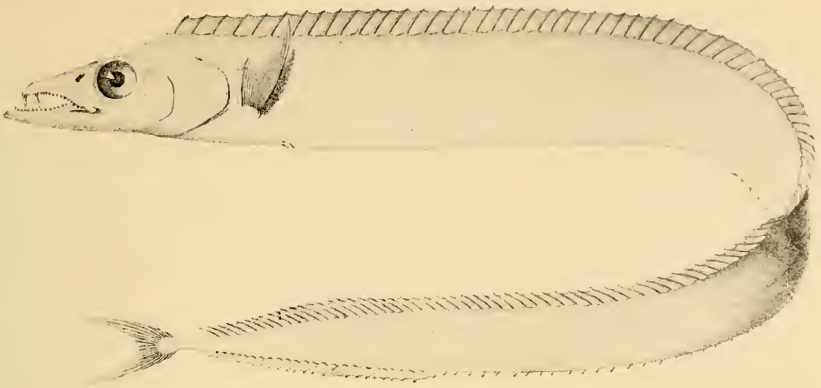
Colour.—Greenish, paler or silvery below, 6 black vertical cross-bars extending to middle of side, more or less confluent above, sometimes extending on to dorsal fin ; head with broad red bands radiating from eye, sometimes one or two reddish longitudinal bands along side ; dorsal and anal pale yellowish, the former with a black or deep blue band, the latter with a black spot anteriorly ; base of pectoral with a black bar, axil black, hinder half of caudal greyish.

Locality.—Natal coast, Mozambique.

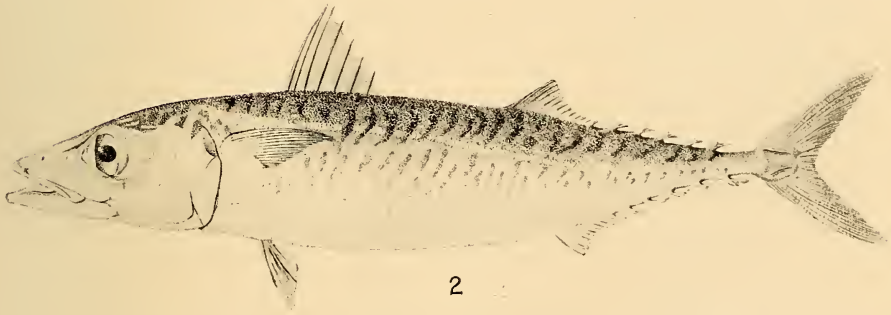
Distribution.—Indo-Pacific to China.

PLATE XXX.

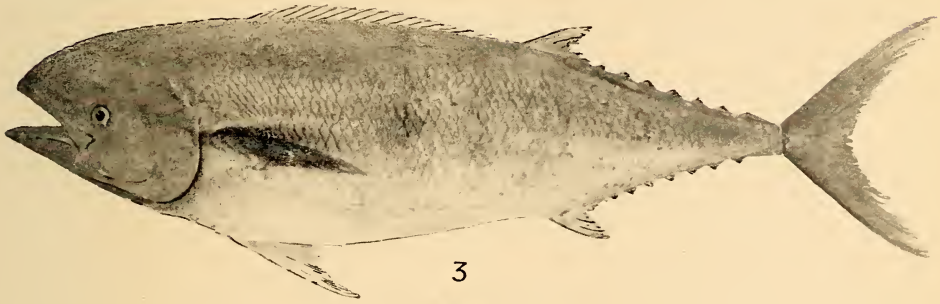
FIG.		TEXT-PAGE
1.	*Lepidopus caudatus* (Euphr.) (after C. and V.)	791
2.	*Scomber colias* Gmel. (after C. and V.)	794
3.	*Gasterochisma melampus* Rich. (original photo)	804
4.	*Xiphias gladius* Linn. (original photo)	805



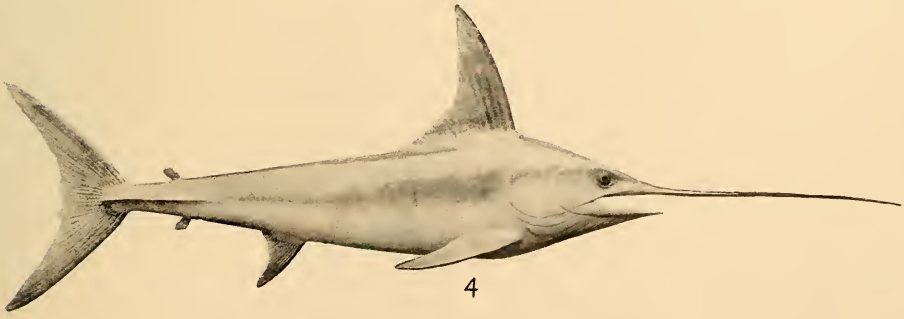
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Thalassoma hebraicum (Lac.).

Collar Wrasse.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, pp. 455, 526, pl. xxix, fig. 3.

1878–88. Day, Fish. India, p. 404, pl. lxxxvi, fig. 2.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 379 (references).

Depth $3\frac{1}{2}$–$3\frac{3}{4}$, length of head $3\frac{1}{4}$–$3\frac{1}{2}$, in length of body. Eye 5–6 in length of head. Gill-rakers 13–14 on lower part of anterior arch, short, stout. D VIII 13. A III 11. Caudal truncate, with the lobes produced in adult. Scales : l.l. 27–28.

Length.—Up to 180 mm.

Colour.—Green, darker above, each scale often with a dark vertical mark ; with a white or yellowish, dark-edged, vertical (slightly oblique) cross-bar from first 2 dorsal spines to behind ventrals, often indistinct in adult ; head bluish, with 3 red or violet streaks radiating backwards from eye, the middle one curving over the cheek ; dorsal and caudal greenish, former with a black ocellus or patch anteriorly, latter with a dark semilunar vertical bar ; anal light, dorsal and anal sometimes with a dark band, often a black spot on pectoral.

Locality.—Natal coast, Delagoa Bay, Mozambique.

Distribution.—East coast of Africa, Mauritius, Madagascar, and Indian seas.

Thalassoma lunare (Linn.).

Yellow-tail Wrasse.

1758. Linné, Syst. Nat., ed. 10, p. 283.

1862. Bleeker, Atl. Ichth., vol. i, p. 90, pl. xxxiii, fig. 5.

1878–88. Day, Fish. India, p. 403, pl. lxxxvi, fig. 1.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 379 (references and synonymy).

Depth a little less than length of head, $3\frac{1}{2}$–$3\frac{3}{4}$ in length of body. Eye 5–6 in length of head. Gill-rakers 10–11 on lower part of anterior arch, short. D VIII 13. A III 11. Caudal lunate, lobes strongly produced in adult. Scales : l.l. 27–28.

Length.—Up to 230 mm.

Colour.—Green, each scale with a vertical red mark ; head green or violaceous, with pink, red, or lilac curved bands and spots ; a similarly coloured triangular patch below base of pectoral, and a

stripe from gill cleft above base of ventral nearly to anal; dorsal and anal light green at base, then a band of peacock-blue and a marginal band of pink; caudal bright yellow in centre, each lobe with a pink stripe bordered above and below with blue; ventrals blue; pectoral blue, with a large pink, red, or lilac oval spot in centre.

Locality.—Natal and Zululand coast, Delagoa Bay, Mozambique.

Distribution.—Indo-Pacific to China and Japan.

A young specimen, 80 mm. long, resembles other preserved specimens in having indications of the vertical marks on the scales, the dark nebulous patch at base of caudal, bicoloured pectoral, and dark base with light margin to the dorsal and anal fin; but has in addition an irregular black patch on the basal band between the 2nd–6th dorsal rays.

**Thalassoma commersoni* C. and V.

Bicoloured Wrasse.

1839. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xiii, p. 418.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 184 (*bicolor*), and p. 508.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322 (*bicolor*).

Depth 4, length of head $3\frac{3}{4}$, in length of body. D VIII 13. A III 11. Caudal lobes produced. Scales: l.l. 28.

Length.—Up to 200 mm.

Colour.—Anterior part of body and back dark blackish olive or violaceous; hinder part, belly, and caudal peduncle pale olive; dorsal with a black spot between 1st and 3rd spines, and a broad violet band, with base and margin yellowish; anal with basal violet band and yellow margin; base and lobes of caudal blackish; large black spot on hind end of pectoral, and a black axil.

Locality.—Natal coast.

Distribution.—Mauritius.

Gen. Chilinus Lac.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 529.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 653.

Body oblong, compressed. Scales large. Snout conical. Cheek and opercle with large scales. Preopercle entire. Teeth uniserial, anterior ones canine-like; no posterior canine. Dorsal spines 9, rarely 10. Dorsal and anal with more or less developed basal sheath.

Caudal rounded in young, truncate or lunate with the angles prolonged in adult ; middle ray also sometimes prolonged. Lateral line interrupted, the tubules simple or branched.

Key to the South African species.

1. Lateral line tubules simple. Dorsal spines 9.
   a. A violet spot behind orbit . . . . . *mossambicus.*
   b. No violet spot behind orbit . . . . . *radiatus.*
2. Lateral line tubules branched. Dorsal spines 10 . . . . *chlorurus.*

**Chilinus mossambicus* Gnthr.

1839. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xiv, p. 91 (*radiatus*, non Bl. Schn.).

1855. Peters, Wiegm. Arch., p. 264 (*radiatus*, non Bl. Schn.).

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 127.

1866. Playfair and Günther, Fish. Zanz., p. 88.

Depth 3, length of head a little less than 3, in length of body. D IX 9–10. A III 8. Caudal with upper and middle rays prolonged in adult. Scales : l.l. 20–23. Lateral line tubules simple.

Length.—Up to 130 mm.

Colour (as preserved).—Brownish-olive, clouded with blackish, head with yellow lines radiating from eye, a violet spot behind eye, spinous dorsal brownish-black, upper part of soft dorsal, anal, and caudal with yellow reticulations.

Locality.—Mozambique coast.

Distribution.—Zanzibar, East Indies, New Hebrides.

Chilinus radiatus (Bl. Schn.).

1801. Bloch Schneider, Syst. Ichth., p. 270, pl. lvi.

1862. Bleeker, Atl. Ichth., vol. i, p. 68, pl. xxvi, fig. 1.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 131.

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 556.

1876–81. Günther, Fische d. Südsee, vol. ii, p. 247, pl. cxxxv, fig. A.

1913. Weber, Siboga Exp. Monogr., 57, p. 365.

Depth 3, length of head a little less than 3, in length of body. D IX 10. A III 8. Caudal truncate. Scales : l.l. 23. Lateral line tubules simple.

Length.—Up to 290 mm.

Colour.—Reddish or greenish, belly pinkish, each scale with a red

spot (if ground colour is red, these spots are of a darker or brighter shade), head with dull red or crimson spots and lines more or less radiating from eye, a series of dark brown or violet lines running obliquely across cheek to lower angle of gill-cover ; fins reddish or greenish, spinous dorsal often violaceous, caudal bluish-green, iris similar to the ground colour, with a blue horseshoe-shaped band (Klunzinger says a bright red ring.)

Locality.—Mozambique.

Distribution.—East coast of Africa, East Indies, South Pacific.

**Chilinus chlorurus* Bl.

1785. Bloch, Ichthyol., vol. v, p. 24, pl. cclx.

1831. Bennett, Proc. Zool. Soc., vol. i, p. 167 (*punctatus*).

1839. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xiv, p. 87, pl. cccxcvi (*punctulatus*).

1862. Bleeker, Atl. Ichth., vol. i, p. 65, pl. xxvii, fig. 3.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 127 (*punctatus*), and p. 128.

1866. Playfair and Günther, Fish. Zanz., p. 89 (*punctatus*).

1876–81. Günther, Fische d. Südsee, vol. ii, p. 245, pl. cxxxii.

1878–88. Day, Fish. India, p. 393, pl. lxxxii, fig. 6.

1913. Weber, Siboga Exp. Monogr., 57, p. 363.

Depth $2\frac{1}{2}$, length of head 3, in length of body. D X 9. A III 8. Caudal trilobed in adult, the upper, middle, and lower rays produced. Scales : l.l. 22. Lateral line tubules branched.

Length.—Up to 270 mm.

Colour.—Olivaceous, head and most of the scales on body with yellow dots, head also with some yellow lines around the eye, the dots may be red or pale bluish ; dorsal reddish or greenish, with a yellow margin and a dark or greenish inframarginal band ; soft dorsal and anal more or less mottled ; ventrals, anal, and caudal with numerous yellow dots.

Locality.—Mozambique.

Distribution.—Indian seas, East Indies, South Pacific.

Gen. Hemipteronotus Lac.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 215.

1815. Cuvier, Mem. Mus. d'Hist. Nat., vol. i, pp. 324, 329 (*Xyrichthys*).

1817. *Id.*, Règne Anim., ed. 1, p. 265 (*Novacula*).

Body oblong, compressed. Scales large. Head nearly scaleless; more or less developed patches of scales on cheek and suborbital or supraopercular regions. Snout more or less obtuse, profile often steep. Upper part of head high, often gibbous, or with a sharp median ridge. Preopercle entire. Teeth uniserial, anterior ones canine-like, a few inner granular ones; no posterior canines. Dorsal spines 9, the 2 anterior ones sometimes remote from the rest, inserted on the nape. Soft dorsal and anal without basal sheath. Caudal rounded-truncate. Lateral line interrupted, continued on caudal peduncle at a lower level.

As Günther (Cat. Fish. Brit. Mus., vol. iv, p. 169) remarks, no hard and fast distinction can be made between the genera or subgenera into which it has been proposed to split this genus. The most distinctive species are those with the first 2 dorsal spines elevated and widely separated from the rest of the fin, which are grouped under the genus *Iniistius* Gill.

This latter genus is here accepted, and for the genus *Xyrichthys* (=*Novacula*) the earlier name of *Hemipteronotus* Lac. adopted.

Two or three species have been recorded from the "Cape" or "South Africa" which would appear not to belong really to the South African fauna. The first is the European, Madeiran, and West Indian *novacula* Linn., to which Günther (Cat. Fish. Brit. Mus., vol. iv, p. 170) assigns a stuffed specimen from "South Africa." The record is preceded by a query mark.

The very similar, if not identical, *argentimaculata* Stndr. (1861, Verh. Zool. Bot. Ges. Wien, vol. xi, p. 134), described from two examples in the Vienna Museum from the Cape of Good Hope, has never since been recognised. Günther (1862, Cat. Fish. Brit. Mus., vol. iv, p. 170) identifies a specimen in the British Museum (ex Berlin Museum) from Brazil with Steindachner's species.

Ribeiro (1915, Arch. Mus. Nac. Rio de Janeiro, vol. xvii) mentions *novacula* but not *argentimaculata* as belonging to the fauna of Brazil. He also states that *splendens* Cast. 1855 extends to the Cape of Good Hope.

On the west coast of Africa *novacula* has not been recorded further south than Senegal (Pellegrin, 1914, Ann. Inst. Ocean., vol. vi, p. 64).

Under these circumstances it seems better to exclude both *novacula* and *argentimaculata* from the fauna-list until their presence is ascertained by authentic captures. Both species (if they really are separable)

have a steep profile and a sharp ridge on the head, the first 2 dorsal spines not elevated and not remote from the rest, and a silvery spot on the side.

Key to the South African species.

1. First 2 dorsal spines remote from the rest, but connected by membrane. Profile steep (*Hemipteronotus*) . . . . . *pentadactylum.*
2. First 2 dorsal spines not remote from the rest. Profile sloping (*Novaculichthys*) *macrolepidotum.*

**Hemipteronotus pentadactylum* (Linn.).

Five-finger Wrasse.

1758. Linné, Syst. Nat., vol. i, p. 447.
1862. Bleeker, Atl. Ichth., vol. i, p. 150, pl. xxx, fig. 4.
1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 177.
1878–88. Day, Fish. India, p. 402.
1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 459.
1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.
1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 260.

Profile very steep. Upper edge of head rather obtuse. Depth 3 or a little more, length of head $3\frac{1}{2}$, in length of body. Eye $4\frac{1}{2}$ in length of head. Preorbital deep, about twice the eye-diameter. D IX 12, the first 2 spines a little higher than the rest, flexible, remote but connected by membrane. A III 12. Only the last 3–4 dorsal and 8–9 anal rays are branched. Outer ventral ray prolonged. Scales : l.l. 28 ; 7–9 series on cheek.

Length.—Up to 150 mm.

Colour.—Light brownish, with a reddish or greenish tinge, a row of 5–6 oval, red (white in alcohol) spots on suprascapular region, most of the scales with a red spot at base, a blackish blotch on the side below lateral line (covered by the end of the pectoral fin), dorsal with oblique bluish or reddish lines, anal with 2 longitudinal and caudal with several vertical bars of the same colour, ventrals yellowish, median line of head with a bluish stripe.

Locality.—Natal coast.

Distribution.—Indian seas, East Indies to China.

H. punctulata C. and V. (*cf.* Day, Fish. India, p. 402, pl. lxxxviii, fig. 2) is very similar, but lacks the spots behind the eye on the suprascapular region.

The vernacular name alludes to the spots which look as if made by the five fingers of a hand.

Hemipteronotus macrolepidotum (Bl.).

Black-chested Wrasse.

1785. Bloch, Ausländ. Fische, p. 135, pl. cclxxxiv, fig. 2.

1861. Steindachner, Verh. Zool. Bot. Ges. Wien, vol. xi, p. 136, pl. iv, fig. 1 (*arago*).

1862. Bleeker, Atl. Ichth., vol. i, p. 144, pl. xxxi, fig. 6.

1862. Günther, Cat. Fish. Brit. Mus., vol iv, p. 174.

1913. Weber, Siboga Exp. Monogr., 57, p. 377.

1925 Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 259.

Profile sloping. Upper edge of head obtuse. Depth $3\frac{2}{3}$–$3\frac{3}{4}$, length of head $3\frac{1}{2}$–$3\frac{2}{3}$, in length of body. Eye 5–$5\frac{1}{2}$ in length of head. Preorbital shallow, depth about equal to eye-diameter. D IX 12–13, first 2 spines not elevated, not remote from rest. A III 12–13. None or only the last 2–3 dorsal and anal rays branched. Outer ventral ray usually prolonged, extending to anal. Scales: l.l. 24–26; 2–4 rows below the eye.

Length.—Up to 140 mm.

Colour.—Rosy or light greenish, pale yellowish below, some bluish or white spots on side behind the pectoral region, a series of black irregular spots forming a more or less continuous longitudinal stripe from opercle to caudal peduncle, these spots sometimes confined to the hinder part of body; a black patch on median line in front of bases of ventrals, head with a dark green or violaceous bar from snout to eye, 3 similar bars radiating backwards from eye, the lower one more or less crescentic; all these bands with narrow white, yellow, or dull orange borders, margin of flap of opercle dark green or violaceous; fins rosy or greenish, usually a dark or black spot between 1st and 2nd dorsal spines, soft dorsal and usually anal with dark, wavy, oblique lines or spots, caudal sometimes with dark spots forming bars, iris yellow, with a cobalt-blue ring.

Locality.—Delagoa Bay, Mozambique.

Distribution.—East Indies.

All the living specimens I have seen have been of a greenish tint, with the bars on the head dark green bordered with dull orange. In addition there were two dull orange bars, one from the chin, the other from a little further back, curving upwards and backwards across the cheek, and some faint reddish chevron-shaped cross-bars on the lower half of the body above the anal fin. Thus they agree far more with the descriptions of Quoy and Gaimard and of Steindachner than with Bleeker's coloured figure.

Gen. Iniistius Gill.

1862. Gill, Proc. Ac. Nat. Sci. Philad., p. 143.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 654.

Similar to *Hemipteronotus*, but the first 2 dorsal spines considerably elevated and completely detached from rest of fin, inserted far forward on the occiput. Profile steep. Upper edge of head sharp.

**Iniistius tetrazona* (Blkr.).

Crested Wrasse.

1859. Bleeker, Nat. Tyds. Ned. Ind., vol. xvii, p. 169.

1862. *Id.*, Atl. Ichth., vol. i, p. 149, pl. xxx, fig. 1.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 175.

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 531.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

Depth a little less than 3, length of head $3\frac{1}{2}$, in length of body. Eye 4–5 in length of head. Preorbital deep, depth nearly twice the eye-diameter. D II+VII 12, 1st spine about equal to depth of body, 2nd shorter. A III 12. Scales : l.l. 25–28. A few very small scales below eye.

Length.—Up to 160 mm.

Colour.—Rosy, yellowish or milky white below, with 5 broad, olive-brown or blackish cross-bars continued on to the dorsal and anal fins, the first across top of head and continued as a narrower and fainter bar from eye to angle of mouth, the last across base of caudal fin, detached dorsal and the ventrals black, soft dorsal with 2 black white-edged ocelli situated in the 3rd and 4th cross-bands, caudal yellowish or rosy.

Locality.—Natal coast.

Distribution.—East Indies, Red Sea.

Gen. Cymolutes Gnthr.

1861. Günther, Ann. Mag. Nat. Hist., vol. viii, p. 387.

1862. *Id.*, Cat. Fish. Brit. Mus., vol. iv, p. 207.

Similar to *Hemipteronotus*, but scales small. First two dorsal spines not elevated or remote from rest.

Cymolutes praetextatus (Q. and G.).

1834. Quoy and Gaimard, Voy. Astrol., Poiss., p. 712, pl. xv, fig. 4.

1839. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xiv, p. 54, pl. cccxcii (*torquatus*).

1862. Bleeker, Atl. Ichth., vol. i, p. 146, pl. xxxi, fig. 1.

1878–88. Day, Fish. India, p. 409, pl. xc, fig. 1.

Depth $3\frac{1}{2}$–4, length of head $3\frac{1}{3}$–$3\frac{1}{2}$, in length of body. Eye 4–5 in length of head. Preorbital deep, depth twice eye-diameter. Canines prominent. D IX 12. A III 12. Scales : l.l. 73 (Day), 80–92.

Length.—Up to 150 mm.

Colour.—Dull greenish, top of head sage-green, a dark blue-edged slightly oblique bar across shoulder above pectoral ; a series of narrow brownish curved or angularly bent cross-bars, which are sometimes confined to the hinder half of body or absent altogether ; an indistinct brownish vertical bar across opercle ; dorsal, caudal, and anal greenish, with faint reddish margins ; spinous dorsal often with a black or pale violet margin, or the whole dorsal is rosy with blue or violaceous oblique wavy bars, and the anal pinkish.

Locality.—Delagoa Bay.

Distribution.—East coast of Africa, Indian seas, East Indies.

C. lecluse Q. and G., from the Hawaiian Islands, appears to be scarcely distinct. It is said to have a black ocellus on side below 8th dorsal spine (Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 327). Playfair and Günther (Fish. Zanz., p. 102) describe a variety of *praetextatus* which has a black spot below the 6th dorsal spine. Further investigation will probably show that only one species with variable coloration should be recognised.

Fam. 49. Scaridae.

Parrot-fishes.

Body oblong, compressed, with large cycloid scales. Cheeks and opercles scaly. Three enlarged scales at base of caudal fin. Mouth not protractile. Maxilla firmly attached to premaxilla, slipping under preorbital. Teeth united to form a pair of sharp-edged cutting plates, resembling the beak of a parrot, or the teeth are fixed to the anterior edges of these plates, imbricate, with their apices more or less distinct ; separate posterior canines sometimes present in upper jaw. Lower pharyngeals completely united into one bone, quad-

rangular, concave, with transversely expanded linear teeth forming a pavement; second upper pharyngeals united with 3rd and 4th, similarly toothed. Nostrils paired. Gill-membranes sometimes joined to isthmus, sometimes united to form a fold across it. Gills $3\frac{1}{2}$. Pseudobranchiae present. Dorsal fin single, spines 9(8–10), flexible or pungent, rays 10–11. Anal spines 2–3. Ventrals thoracic, of a spine and 5 rays, with axillary process. Caudal rounded in young, truncate or lunate in adult. Lateral line single, more or less sharply bent posteriorly, more or less completely interrupted. Air-bladder present. No pyloric caeca. No subocular shelf.

Tropical and subtropical shore fishes of brilliant coloration, and often of rather large size (4 feet), feeding on vegetable matter, corals, or hard-shelled molluscs. They are not greatly valued as food, and some species are reputed to be poisonous.

There is great uniformity in the various genera and species as regards the number of scales and the fin formulae. The former scarcely varies except on the cheeks. The coloration is often distinctive, but as in the Wrasses probably varies considerably in many species, in consequence of which many nominal species have been instituted.

Key to the South African genera.

1. Two to four series of scales on cheek . . . . . *Scarus.*
2. A single series of scales on cheek.
   - *a.* Lateral line continuous . . . . . *Scarichthys.*
   - *b.* Lateral line interrupted . . . . . *Callyodon.*

Gen. Scarus Forsk.

1775. Forskal, Descr. Anim., p. 25.

1861. Bleeker, Versl. Ak. Wet. Amsterd., vol. xii, p. 3 (*Pseudoscarus*).

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 216 (*Pseudoscarus*).

1898. Jordan and Evermann, Fish. Mid. North Amer., vol. ii, p. 1642.

1902. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 658.

Two or more series of scales on cheek. Upper lip single in front, double only near angle of mouth. Teeth completely soldered together; one or more posterior canines present or absent. Dentigerous plate of lower pharyngeal longer than broad. Dorsal spines flexible, the membrane between them not excised; basal sheath more or less

developed. Pectorals triangular. Lateral line usually completely interrupted.

As Günther (*loc. cit.*, p. 217) remarks, it is extremely difficult, if not impossible, to identify with certainty preserved examples of this genus. Detailed notes of coloration should therefore be made at the time of capture and attached to every specimen. The fin and scale formulae are very constant throughout the genus, viz. D IX 10. A II–III 8–9. Scales : l.l. 23–27.

Key to the South African species.

1. A single scale on lower preopercular limb . . . . . *guttatus.*
2. Two scales on preopercular limb . . . . . *enneacanthus.*

Scarus guttatus Bl. Schn.

Blue-spotted Parrot-fish.

1801. Bloch Schneider, Syst. Ichth., p. 294.

1803. Lacépède, Hist. Nat. Poiss., vol. iv, pp. 5, 21, pl. i, fig. 3 (*maculosus*).

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 468.

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, p. 259 (*natalensis*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 383 (*maculosus*, references, and *natalensis*).

? 1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 261 (*collana*).

Depth about equal to length of head, a little less than 3 in length of body. Eye about 6 in length of head. Two series of scales on cheek and a single scale on lower preopercular limb, middle series on cheek composed of 5 scales. No posterior canine. Dorsal spines subequal. Angles of caudal somewhat produced. (Plate XXXII, fig. 1.)

Length.—Up to 380 mm.

Colour.—Yellowish, head and body with irregular blue spots, bright coloured streaks from mouth to eye, vertical fins edged with blue, with blue spots along their bases, jaws whitish.

Locality.—Natal and Zululand coast, Delagoa Bay, Mozambique.

Distribution.—Mauritius.

Type of *natalensis* in South African Museum.

The description of *natalensis* discloses no real differences between it and the specimen doubtfully identified as *maculosus* by Gilchrist

and Thompson (*loc. cit.*, p. 258), and reference to the type specimen removes the few slight differences that are given. Thus the lateral series of scales is in both cases 25, though the pierced scales of the lateral line number 2–3 more. There are only 5 scales in the middle series across the cheek.

There would seem to be no necessity for the institution of *natalensis*, especially when based on a preserved specimen. In view of Günther's remarks quoted above, the specimen may be identified with *guttatus*, which has already been recorded by Regan from Zululand.

Fowler's record of *collana* Rüpp. may also refer to this species.

**Scarus enneacanthus* Lacép.

1803. Lacépède, Hist. Nat. Poiss., vol. iv, pp. 2, 6.

1803. *Id.*, *ibid.*, pp. 3, 12, pl. i, fig. 1 (*denticulatus*).

1803. *Id.*, *ibid.*, pp. 2, 11 (*chadri*).

1839. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xiv, p. 228, pl. cdiii (*capitaneus*).

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 228 (*capitaneus*).

1866. Playfair and Günther, Fish. Zanz., p. 106 (*capitaneus*).

Two series of scales on cheek and two scales on lower preopercular limb, the middle series composed of 6 scales. First dorsal spine shortest. Caudal rounded in young, emarginate in adult.

Colour.—Blue, vertical fins edged with lighter (Günther); brownish, with 3 rows of large whitish spots, the first of 3 spots near base of dorsal, 2nd of about 6 spots below lateral line, 3rd also of about 6 spots from axil of pectoral; dorsal, anal, and caudal uniform brown (Playfair and Günther).

Locality.—Mozambique.

Distribution.—Mauritius, Zanzibar.

Gen. Scarichthys Blkr.

1861. Bleeker, Versl. Ak. Wet. Amsterd., vol. xii, p. 2.

1862. *Id.*, Atl. Ichth., vol. i, p. 15.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 212.

A single series of scales on cheek. Upper lip double in its whole circuit. Teeth completely soldered together, those in lower jaw in very oblique series; no posterior canine. Dentigerous plate of lower pharyngeal broader than long. Dorsal spines flexible, the membrane between them excised; no scaly basal sheath. Pectorals short,

rounded. Lateral line only slightly bent posteriorly, scarcely interrupted.

Scarichthys coeruleopunctatus (Rüpp.).

Brown Parrot-fish.

1835. Rüppell, Neue Wirbelt. Fische, p. 24, pl. vii, fig. 3.
1862. Bleeker, Atl. Ichth., vol. i, p. 16, pl. i, fig. 2.
1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p 557.
1878–88. Day, Fish. India, p. 410, pl. lxxxvii, fig. 5.
1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 260.

Depth about equal to length of head, about $3\frac{1}{3}$ in length of body. Eye 4 (young)–5 in length of head. D IX 10. A II 8–9. Scales : l.l. 23–24.

Length.—Up to 250 mm.

Colour.—Olive-brown, scales mostly fuscous at base, with numerous small white or blue dots (dark in preserved specimens), and a more or less continuous and regular white or blue stripe from opercle to caudal, cheek pale, vertical fins and ventrals with small brown spots.

Locality.—East London, Delagoa Bay.

Distribution.—East coast of Africa, Indian seas, Malay Archipelago.

A supposed second species with similar distribution, viz. *auritus* C. and V., is stated by Bleeker (*loc. cit.*, p. 16) to have been recorded from Mozambique. It is said to differ from *coeruleopunctatus* by having a broad dark band from one cheek to the other across the throat, divided on the throat by two white bars, and other minor characters. Bleeker, however, admits that the two are very difficult to distinguish in the young state.

This Parrot-fish may be recognised at once by its brownish coloration, very different from the brilliant colours of other Parrot-fishes.

Gen. Callyodon (Gron.) Cuv.

1766. Gronovius, Mus. Ichth., vol. ii, p. 8.
1839. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xiv, p. 285.

A single series of scales on cheek. Upper lip single in front, double posteriorly. Anterior teeth imbricate, more or less distinct ; one or two posterior canines. Dentigerous plate of lower pharyngeals broader than long. Dorsal spines flexible, membrane between them not excised ; basal sheath present. Pectorals triangular. Lateral line abruptly bent, more or less interrupted.

**Callyodon viridescens* (Rüpp.).

1835. Rüppell, Neue Wirbelt. Fische, p. 23, pl. vii, fig. 2.
1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 214.
1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 558.
1878–88. Day, Fish. India, p. 410, pl. xc, fig. 2.
1925, Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 261 (*Leptoscarus v.*).

Depth $2\frac{2}{3}$–3, length of head 3–$3\frac{1}{2}$, in length of body. Eye $4\frac{1}{2}$–5 in length of head. Usually no teeth behind the front series in upper jaw. D IX 10. A II 8–10. Scales : l.l. 24–26.

Length.—Up to 260 mm.

Colour.—Olivaceous or brownish-yellow, marbled or spotted with darker, each scale with a dark (reddish) spot or streak and whitish specks, head with red streaks radiating from eye ; dorsal and anal and caudal with red spots or wavy lines, often a black spot between 1st and 2nd dorsal spines.

Locality.—Delagoa Bay.

Distribution.—East coast of Africa, Indian seas.

Group TEUTHIDOIDEI.

Key to the South African families.

1. Tail armed with spines or plates. Teeth incisiform . . *Teuthididae.*
2. Tail unarmed. Teeth setiform . . . . . *Zanclidae.*

Fam. 1. Teuthididae (Acanthuridae).

Surgeon-fishes.

Body ovate, compressed, with minute scales, usually ctenoid, often rough. Mouth very small, not or but slightly protractile. Maxilla immovably united with premaxilla. Subocular shelf more or less developed. Teeth incisor-like, in a single row in each jaw ; no vomerine or palatine teeth. Nostrils paired. Gill-membranes broadly attached to isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Gill-rakers greatly reduced or obsolete. A single dorsal fin. Anal spines 2–3. Ventrals thoracic, of a spine and 2–5 rays, without axillary process. Caudal truncate, emarginate, or lunate. Air-bladder present. Pyloric caeca few. Lateral line single. Caudal peduncle armed with one or more sharp spines or bony plates.

A family of moderate-sized herbivorous fishes found in all warm

seas, especially among coral reefs, and distinguished by their caudal armature. The sharp, lancet-like shape of the spine has suggested their common name.

The young stages are very different in appearance from the adults, and have been described as separate genera.

Key to the South African genera.

1. Tail with an antrorse erectile spine on each side . . . . *Teuthis.*
2. Tail with a pair of immovable bony plates on each side . . *Monoceros.*

Gen. Teuthis Linn.

1763. Gronovius, Zooph. Gronov. (*Hepatus* nonbinomial).

1766. Linné, Syst. Nat., ed. 12, p. 507.

1775. Forskal, Descr. Anim., p. 59 (*Acanthurus* part).

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 345 (*Acronurus*, young).

1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, p. 551.

1913. Weber, Siboga Exp. Monogr., 57, p. 316 (*Acanthurus*) (fig. of larva).

Tail with a sharp antrorse movable spine on each side. Dorsal fin with about 9 spines, anal with 3. Soft dorsal and anal not elevated. Teeth serrulate. Snout blunt. Ventral with 5 rays. Coloration often brilliant.

The young stages, *Acronurus*, are subcircular in side view, scaleless, the skin vertically wrinkled or corrugated, opercles and breast silvery, the rest of the body more or less transparent.

This generic name has often been applied to the members of the following family and *Acanthurus* used in its place.* The numerous species of this genus badly require revision.

These fishes should be handled with care, as they lash their tails from side to side when captured, and are capable of inflicting a nasty wound.

Key to the South African species.

1. Teeth not dilated, fixed (*Teuthis*).
   - *a.* With dark cross-bars . . . . . *triostegus.*
   - *b.* Without dark cross-bars.
     - i. With a dark spot at base of last dorsal and anal rays . *elongatus.*
     - ii. No dark spots on last dorsal and anal rays . . *nigrofuscus.*
2. Teeth dilated, movable (*Ctenochaetus*) . . . . . *striatus.*

* But see Opinion 93, Intern. Comm. Nomencl., Smiths. Misc. Coll., vol. lxxiii, p. 10.

Teuthis triostegus (Linn.).

Barred Surgeon-fish.

1758. Linné, Syst. Nat., ed. 10, p. 274.

1878–88. Day, Fish. India, p. 204, pl. xlviii, fig. 2.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 373 (references and synonymy).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 252 (*Hepatus t.*).

Depth not quite 2, length of head 3–4, in length of body. Eye 3–4 in length of head, $1\frac{1}{2}$–$2\frac{1}{2}$ in snout. Profile of snout somewhat concave. Teeth fixed. D IX–X 22–25. A III 20–22. V I 5. Scales small and ctenoid on body, rudimentary on head. Caudal spine small, without posterior process. (Plate XXXI, fig. 5.)

Length.—Up to 230 mm.

Colour.—Dark greenish or slaty, more or less clouded with yellow; chin, throat, belly, and a narrow strip along base of anal white, sharply demarcated from the dark colour above by a narrow irregular dark band; 5 narrow black vertical bars, the 1st through the eye; caudal peduncle with 2 black spots on each side, the upper one often connected with its fellow on the opposite side; vertical fins dusky, anal with narrow white border, pectoral pale, ventrals white below, dusky above.

Locality.—Natal coast.

Distribution.—Indo-Pacific to Japan and Australia.

T. sandvichensis Streets should be included in the synonymy of this widely distributed species.

Teuthis elongatus (Lacép.).

Two-spot Surgeon-fish.

1802. Lacépède, Hist. Nat. Poiss., vol. iv, p. 471, pl. vi, fig. 2.

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 331 (*bipunctatus*).

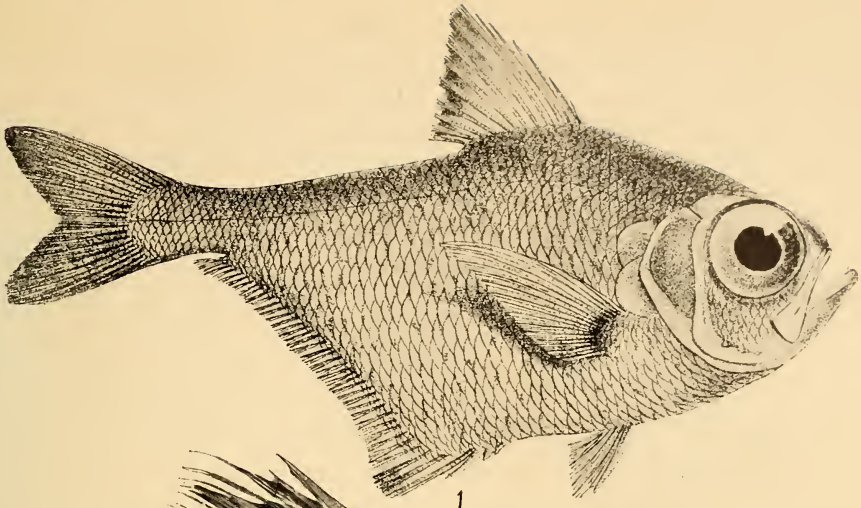
1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, p. 554 (*bipunctatus*).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 389 (synonymy).

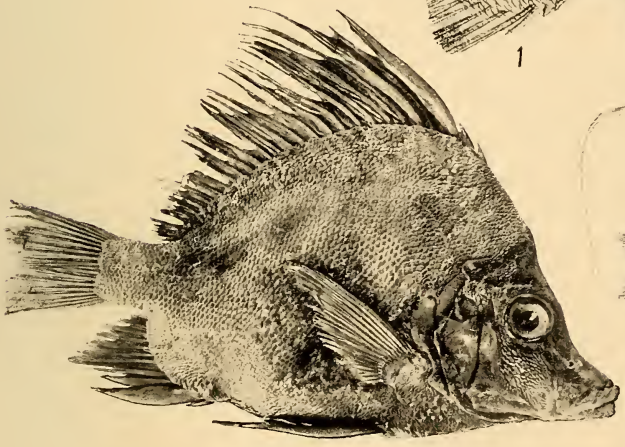
Depth 2, length of head $3\frac{1}{2}$, in length of body. Eye $4\frac{1}{5}$ in length of head, $2\frac{2}{3}$ in snout. Profile slightly concave on snout, convex on the interorbital. Teeth fixed, 14 in upper, 16 in lower jaw. D IX 26.

PLATE XXXI.

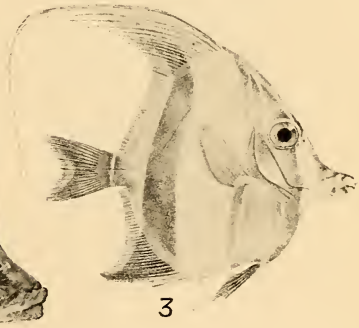
FIG.		TEXT-PAGE
1.	*Liopempheris russelli* (Day) (after Day)	668
2.	*Histiopterus spinifer* Gilch. (original photo)	620
3.	*Zanclus canesens* (Linn.) (after Day)	782
4.	*Siganus oramin* (Bl. Schn.) (after Day)	785
5.	*Teuthis triostegus* (Linn.) (after Day)	778
6.	*Platax teira* Forsk. (after Day)	605



1



2



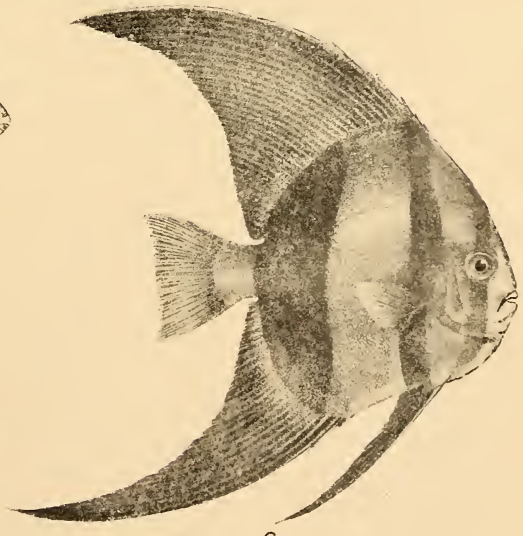
3



4



5



6

Neill & Co., Ltd.

A III 24. V I 5. Scales ctenoid on body; cycloid, more or less rudimentary, on head. Caudal spine with posterior process.

Length.—Up to 190 mm.

Colour.—Uniform brown, with very obscure traces of fine longitudinal lines, dorsal and anal fins darker than body, a black spot at base of last dorsal and anal rays, groove containing caudal spine margined with black, caudal fin with narrow whitish border, lips blackish.

Locality.—Natal coast.

Distribution.—China and Pacific Ocean.

The above description is taken from a single specimen in the South African Museum, which may be identified with the above species. Jordan and Evermann give the depth as 2·8 in the length, but this does not correspond with Jordan and Fowler's description, or with Lacépède's figure, though too much reliance cannot be placed on the latter. The specimen closely resembles Günther's figure of his *lineolatus* (Fische d. Südsee, vol. i, p. 112, pl. lxxiii, fig. A), a species which Jordan and Evermann renamed *atrimentatus* (1903, Bull. U.S. Fish. Comm., vol. xxii, p. 198, and 1905, *ibid.*, vol. xxiii, p. 393, fig. 171), but is darker brown in colour.

Teuthis nigrofuscus (Forsk.).

Surgeon-fish.

1775. Forskal, Descr. Anim., p. 64.

1835. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. x, p. 204 (*matoides*).

1873–75. Günther, Fische d. Südsee, vol. i, p. 109, pl. lxix, fig. B (*blochi*).

1878–88. Day, Fish. India, p. 205 (*matoides*) (synonymy).

1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, p. 553 (*argenteus*) (synonymy).

1903. Jordan, *ibid.*, vol. xxvi, p. 695 (note on use of name *argenteus*).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 388, fig. 168 (*güntheri*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 372 (*matoides*) (references and synonymy), and p. 375.

Depth 2 or not quite 2, length of head $3\frac{1}{3}$–$3\frac{2}{3}$, in length of body. Eye $3\frac{1}{2}$–5 in length of head, 2–3 in snout. Profile convex, especially in large examples. Teeth fixed. D IX 25–28. A III 24–28. V I 5.

Scales small and ctenoid on body, rudimentary on head. Caudal spine with posterior process.

Length.—Up to 600 mm.

Colour.—Dark brown or slaty, more or less mottled, sometimes with narrow light bands across cheeks and along body; vertical fins dark; dorsal and anal with bluish or greyish longitudinal stripes; caudal often with a white cross-band at base, obscure in adult; outer half of pectoral usually yellowish, ventrals dark.

Locality.—Natal coast.

Distribution.—Indo-Pacific to Japan.

T. leucopareius Jenk. and *umbra* Jenk. should also probably be added to the synonymy. This species has been identified with Forskal's *nigrofuscus*, but on this point later authors are not agreed. South African specimens have been recorded under *nigrofuscus* by Regan, and *matoides* by Gilchrist and Thompson.

**Teuthis striatus* (Q. and G.).

Streaked Surgeon-fish.

1824. Quoy and Gaimard, Voy. l'Uranie, Zool., p. 373, pl. lxiii, fig. 3.

1878–88. Day, Fish. India, p. 207, pl. xlvii, fig. 2 (*strigosus*).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 398, fig. 174.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 373 (*strigosus*) (references and synonymy).

Depth not quite 2, length of head $3\frac{1}{2}$, in length of body. Eye 4 in length of head, nearly 2 in snout. Profile more or less convex. Teeth movable, dilated at their ends, with three deep clefts. D VIII 27–30. A III 24–27. V I 5. Scales very small and ctenoid on body, rudimentary on head. Caudal spine with posterior process.

Length.—Up to 200 mm.

Colour.—Coppery-red or dark brown, with numerous very fine longitudinal pale blue lines, which bend upwards and downwards respectively on the hinder ends of dorsal and anal fins; orange or reddish spots on head, ventrals black-tipped, pectoral orange, often a light band on caudal.

Locality.—Zululand coast.

Distribution.—Indo-Pacific.

Gen. Monoceros Schn.

1775. Forskal, Descr. Anim., p. 59 (*Acanthurus* part).

1801. Schneider, Syst. Ichth., p. 186.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 106 (*Naso*).

1815. Rafinesque, Anal. Natur. (*Naseus*).

1835. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. x, p. 304 (*Keris*=young).

1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, p. 558 (*Acanthurus*).

1913. Weber, Siboga Exp. Monogr., 57, p. 320 (*Naseus*) (fig. of larva).

Tail with 2 large immovable, keeled, often brightly coloured plates in adult. Head in adult with a long bony cylindrical horn on the forehead. Dorsal fin with 5–6 spines, anal with 2. Soft dorsal and anal not elevated. Ventral with 3 rays. Teeth usually serrulate. Scales minute, rough.

Indo-Pacific. The caudal plates and frontal horn are not present in the young, but develop gradually. The lesser number of dorsal spines, however, sufficiently distinguishes such young specimens from members of the preceding genus.

Monoceros unicornis (Forsk.).

Unicorn-fish.

1775. Forskal, Descr. Anim., p. 63.

1873–75. Günther, Fische d. Südsee, vol. i, p. 118, pl. lxxviii and text-figs. 1–4.

1902. Jordan and Fowler, *loc. cit.*, p. 559 (references).

Depth $1\frac{1}{2}$ (young)–$2\frac{1}{3}$ (adult), length of head $3\frac{1}{2}$–4, in length of body. Eye 3–$5\frac{1}{2}$ in length of head, $1\frac{1}{3}$–4 in snout, according to age. Specimens up to about 150 mm. in length usually without any trace of horn, which develops gradually, and in old examples may project beyond the vertical from the end of snout. Teeth not serrate. D V–VI 28–31. A II 26–30. V I 3. Caudal in old examples often with upper and lower rays more or less produced as streamers. Caudal scutes developed in examples of about 150 mm; the spines on the scutes develop later.

Length.—Up to 550 mm.

Colour.—Olivaceous-brownish, often with a violet patch over the pectoral spotted with lighter, caudal often bright brown or orange,

the bony scutes blue, dorsal and anal with blue and yellow longitudinal bands, caudal pale olivaceous, pectorals and ventrals pale. Young, uniform olivaceous, with the dorsal and anal fins more or less banded.

Locality.—Mozambique.

Distribution.—Indo-Pacific to Japan.

The young specimen on which the inclusion of this species in the fauna-list is based, is 90 mm. in length and has the teeth finely serrulate. For this reason it may perhaps be the young of *marginatus* C. and V.

Fam. 2. Zanclidae.

Body ovate, elevated, strongly compressed, with minute rough scales. Mouth small, not protractile. Snout more produced in adult than in young. A conspicuous conical spine in front of each eye in adult, absent in young. Teeth slender, setiform, in a single row in jaws, sometimes a few very fine inner teeth ; none on vomer or palatines. Nostrils paired. Gill-membranes broadly united across isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Gill-rakers rudimentary. A single dorsal fin with 7 spines, the 3rd and, to a lesser extent, the following spines elongated, filamentous. Anal spines 3, anterior rays moderately prolonged. Ventrals thoracic, of a spine and 5 rays, without axillary process. Caudal lunate. Air-bladder present. Pyloric caeca moderately numerous (14). Lateral line single. Caudal peduncle unarmed.

A single genus and species found along rocky coasts and coral reefs in the Indo-Pacific region.

Gen. Zanclus C. and V.

1803. Lacépède, Hist. Nat. Poiss., vol. iv, p. 473.
1803. *Id.*, *ibid.*, p. 517 (*Pomacanthus*).
1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. vii, p. 102.
1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, p. 549.
With the family characters.

Zanclus canescens (Linn.).

Moorish Idol.

1758. Linné, Syst. Nat., ed. 10, p. 272.
1878–88. Day, Fish. India, pp. 111, 786, pl. xxviii, fig. 4 (*cornutus*).

1877. Bleeker, Atl. Ichth., vol. ix, p. 77, pl. ccclxvi, figs. 1, 2 (*cornutus*), and p. 78, pl. ccclxvi, fig. 3 (*canescens*).

1876–81. Günther, Fische d. Südsee, vol. ii, p. 142, pl. xcii (ad. and juv.) (*cornutus*).

1902. Jordan and Fowler, *loc. cit.*, p. 549 (references and synonyms).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 382, pl. lvii.

1906. Bryan, Occ. Pap. B.P. Bishop Mus., vol. ii, pt. 4, p. 22, fig. 2 (*ruthiae*).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321.

Depth about equal to length, length of head $2\frac{1}{3}$–$2\frac{3}{5}$, in length of body. Eye $2\frac{1}{2}$ (young)–5 in length of head. D VII 38–45, first 2 spines very short, 3rd elongated into a filament at least equal to length of body, sometimes (young) $2\frac{1}{2}$ times length of body. A III 31–36. Supraorbital ridge serrulate in young, developing in adult into a short, stout, conical spine. Preorbital with a recurved spine above the angle of the mouth in some young examples (*canescens*), absent in others, but always obsolete in adult. (Plate XXXI, fig 3.)

Length.—Up to 200 mm.

Colour.—Anterior part of body white, posterior part white, suffused with yellow or orange or a faint greenish tinge, upper lip and lower jaw blackish ; upper part of snout with a triangular orange patch bordered with black, a broad black vertical band from 1st dorsal spine through eye to ventrals, with a narrow white or bluish border in front, and crossed by 2 narrow bluish stripes which sometimes do not extend above level of pectorals ; a second broad, vertical, black band from anterior rays of dorsal to anterior rays of anal, with a narrow white or bluish stripe near its posterior margin ; fins whitish or yellowish, posterior dorsal and anal rays often with a bluish longitudinal stripe, caudal with a broad black cross-band, margined anteriorly with bluish, ventrals black. In the young the cheeks and breast are bright silver and the black vertical bands are only faintly indicated.

Locality.—Mossel Bay, Natal coast, Delagoa Bay.

Distribution.—Indo-Pacific to Japan and Australia.

The specimen from Mossel Bay, which has been in the South African Museum many years, is a young one 65 mm. long, with preorbital spine and silvery breast.

There are several misstatements and contradictions in the 1902 and 1905 descriptions quoted above.

Group SIGANOIDEI.

Fam. Siganidae.

Body ovate, compressed, with minute cycloid scales, the skin having a very smooth and slippery feeling. Mouth very small, not protractile. Maxilla firmly united with premaxilla. Subocular shelf more or less developed. Teeth incisor-like, in a single series in each jaw; no vomerine or palatine teeth. Nostrils paired. Gill-membranes attached to isthmus. Gills 4, a slit behind 4th. Pseudobranchiae present. Gill-rakers rudimentary. A single dorsal fin, with a forwardly directed procumbent spine in front. Anal spines 7. Ventrals thoracic, each with an inner and an outer spine with 3 intervening rays; no axillary process. Caudal lunate. Air-bladder present. Pyloric caeca few. Lateral line single. Caudal peduncle unarmed.

A family, with two genera, of herbivorous fishes from the Indo-Pacific region. They show several peculiarities, one of the most obvious being the presence of two spines in each ventral fin, from which they get their name; they are usually grouped near the *Teuthididae.*

Gen. Siganus Forsk.

1766. Linné, Syst. Nat., ed. 10, (*Teuthis* part).

1775. Forskal, Descr. Anim., p. 26.

1801. Schneider, Syst. Ichth., p. 206 (*Amphacanthus*).

1850. Cantor, Cat. Malay. Fish., p. 207 (*Teuthis*).

1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, p. 560.

With the characters of the family. Snout not produced.

The species of this genus are extremely hard to identify from preserved specimens, as there are scarcely any morphological characters, and coloration and markings are the principal means of separating the species. Consequently, there has probably been a multiplication of nominal species, the number of which will be reduced when a revision based on adequate material is undertaken. It is very probable that there is really only one species in South African waters.

Key to the South African species.

1. Mottled darker and lighter brown . . . . . *nebulosus.*
2. Brown with white spots . . . . . *oramin.*

Siganus nebulosus (Q. and G.).

Mottled Spinefoot.

1824. Quoy and Gaimard, Voy. Uranie, Zool., p. 369.

? 1828. Rüppell, Atl. Fisch. Roth. Meer., p. 45 (*lurida*).

1908. Stead, Edible Fish. N.S.W., p. 81, pl. xlix.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 374 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 253.

Depth $2\frac{1}{3}$–$2\frac{1}{2}$, length of head $3\frac{4}{5}$–4, in length of body. D I+XII–XIII 10, anterior soft rays higher than posterior spines. A VII 9, anterior rays scarcely longer than last spine. Cheek scaleless.

Length.—Up to 330 mm.

Colour.—Brown or olivaceous, paler below, more or less distinctly mottled and marbled, a more or less distinct dark spot behind opercle above base of pectoral.

Locality.—East London, Natal coast, Delagoa Bay.

Distribution.—Northern and Eastern Australia.

It is possible that *lurida* from the Red Sea is a synonym.

As regards the coloration, it should be noted that the mottling seen in preserved specimens is not natural. When taken out of the water the fish is often uniform olivaceous, which turns brown when the fish is dead. If another fish or pieces of weed, stick, etc. happen to be lying on top of the fish, the shaded parts do not turn brown or dark, and when preserved these accidental light and dark markings are retained.

Siganus oramin (Bl. Schn.).

White-spotted Spinefoot.

1801. Bloch Schneider, Syst. Ichth., p. 207, pl. xlviii (*guttatus* var. *oramin*).

1845. Temminck and Schlegel, Faun. Jap. Poiss., p. 128 (*albopunctatus*).

1878–88. Day, Fish. India, p. 168, pl. xl, fig. 6.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 374 (references).

1919. Regan, *ibid.*, vol. ii, pt. 4, p. 200 (*albopunctatus*).

Similar to the preceding species except in colour.

Colour.—Brownish, with numerous small round white or pale

bluish spots, a large dark spot behind the opercle above base of pectoral. (Plate XXXI, fig. 4.)

Locality.—Natal and Zululand coast.

Distribution.—Indian seas and East Indies to Japan.

S. albopunctatus is usually considered a synonym of *fuscescens* Hout. 1782.

Group SCOMBROIDEI.

(1909. Regan, Ann. Mag. Nat. Hist., (8), vol. iii, p. 66, classification.)

Tail strongly forked, or absent. Scales usually small and thin, or absent. Dorsal and anal spines not detached, weak and slender. Dorsal elongate, single or divided. Ventrals thoracic or subthoracic. Pseudobranchiae present. Premaxilla not protractile, typically produced and pointed. No bony stay for the preopercle.

Though difficult to define, the Scombroids are nevertheless easily distinguished by their general facies. They include the Snoek, true Mackerel, Scabbard Fish, and Sword-fish. In habits they are all rapid and powerful swimmers, and predaceous.

Key to the South African families.

I. No long pointed rostrum.
  A. Strong anterior canine teeth. Pectoral fins placed low.
    1. Spinous dorsal longer than soft . . . . *Gempylidae.*
    2. Body strongly compressed, elongate. Spinous dorsal, if distinct, not longer than soft . . . . . *Trichiuridae.*
  B. No strong anterior canines. Pectoral fins placed high . *Scombridae.*

II. A long pointed rostrum.
  A. Ventral fins absent. Scales absent in adult. No teeth in adult *Xiphiidae.*
  B. Ventrals 1–3-rayed. Scales present. Teeth present . *Histiophoridae.*

Fam. 1. Gempylidae.

Body oblong or elongate, compressed. Maxilla exposed. Spinous dorsal longer than the soft. Anal with 3 spines. Ventral fin of 1 spine and 5 rays, or reduced to the spine only. Caudal fin well developed. Caudal peduncle not keeled. Pectoral placed low. Strong anterior canine teeth in the jaws. Gill-membranes free from isthmus.

Key to the South African genera.

1. Lateral line single (or obsolete).
   a. Ventral fins well developed.
      i. Detached finlets 2 . . . . . *Ruvettus.*
      ii. Detached finlets 6 . . . . . *Thyrsites.*
   b. Ventral fins reduced to a pair of small spines . . . *Gempylus.*
2. Lateral line double . . . . . *Epinnula.*

Gen. Ruvettus Cocco.

1829. Cocco, Giorn. Sci. Sicil., vol. xlii, p. 2.

1895. Goode and Bean, Ocean Ichthyol., p. 196.

Body moderately elongate. Spinous dorsal with 13–15 spines, close to or contiguous with soft dorsal. Anal arising behind origin of soft dorsal. Two detached finlets behind both dorsal and anal. Pectoral slightly nearer ventral than dorsal profile. Ventral well developed. Belly keeled. Skin with minute cycloid scales and with bony spinose plates or tubercles. Lateral line single, but scarcely indicated; the skin on the body, snout, and edges of opercles permeated with fine mucous pores.

Besides the species here mentioned there is *R. tydemani* Weber 1913 from the Indo-Pacific, of which *R. pacificus* Jord. and Jord. 1922 is a synonym. The two forms are very closely allied, the only differences being the slightly smaller numbers of dorsal and anal spines and rays (D XIII+15–16+2, and A 15–16+2), and of longitudinal and transverse series of spiny plates (l.l. 85, l.tr. 38). The single specimen described by Gilchrist and von Bonde from Delagoa Bay agrees with the Atlantic form in the fin formula (the number of spiny plates is not given); and indeed discloses no points of difference which can not reasonably be ascribed to differences in age and sex (or sexual maturity).

The Escolar (=Scholar) is frequently abundant in the deep waters off the West Indies and Madeira, and often enters the Mediterranean. Its flesh is usually regarded as palatable, though the oil is a strong purgative.

Ruvettus pretiosus Cocco.

Escolar; Oil-fish.

1829. Cocco, *loc. cit.*, p. 21.

1895. Goode and Bean, *loc. cit.*, p. 196, fig. 210 (references).

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 16 (*delagoensis*).

Depth 4 (juv.)–6, length of head $3\frac{1}{3}$ (juv.)–4, in length of body. Eye $4\frac{1}{2}$–$5\frac{1}{2}$ in length of head, $1\frac{3}{4}$ in snout, $1\frac{1}{2}$ in interorbital width. Maxilla reaching to about vertical from hind margin of eye. Upper jaw with 3–5 canines in front; 3 strong teeth on vomer, and a single row on palatine. D XIV–XV+16–18+2. A 16–18+2. Gill-rakers greatly reduced, about 8 small pairs of spines on lower part of anterior arch, a single strong spine in the angle of anterior arch. Scales minute, covering whole body and head, with the exception of the interorbital space and the top of snout, both of which areas are likewise free of spiny plates; number of spiny plates: l.l. ca. 120–150; l.tr. ca. 40–50. Pyloric caeca 12.

Length.—Up to 1800 mm. (6 ft.).

Colour.—Dark greyish brown or blackish, lighter below. The Delagoa Bay specimen, 380 mm., is said to be yellowish white.

Locality.—Off Table Bay, Delagoa Bay, 200–275 fathoms.

Distribution.—Tropical parts of the Atlantic, Mediterranean.

Type of *delagoensis* in coll. Govt. Marine Survey.

The number of pyloric caeca and the description of the skin are taken from the Table Bay specimen in the South African Museum.

Gen. Thyrsites C. and V.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 196.

Body moderately elongate. Spinous dorsal with 20 spines in a groove, close to soft dorsal. Anal arising behind origin of soft dorsal. Six detached finlets behind both dorsal and anal. Pectoral slightly nearer ventral than dorsal profile. Ventral moderately developed. Belly not keeled. Scales small. Lateral line single, abruptly curved downwards below the hind part of spinous dorsal.

A single species widely distributed in the Southern Hemisphere, and living in large shoals.

Thyrsites atun (Euphr.).

Snoek; Barracouta (Australia); *Sierra* (Chile).

1791. Euphrasen, Vet. Ac. Nya Handl., vol. xii, p. 315.

1914. Gilchrist, Mar. Biol. Rep., vol. ii, p. 116, fig. (habits and statistics).

1916. *Id.*, *ibid.*, vol. iii, p. 8 (egg).

1918. Thompson, *ibid.*, vol. iv, p. 113 (references).

1921. McCulloch, Rec. Austr. Mus., vol. xiii, pt. 4, p. 139, pl. xxiv, fig. 2.

Depth $7\frac{3}{4}$–8, length of head 4–$4\frac{1}{2}$, in length of body. Eye $6\frac{1}{2}$–7 in length of head. Maxilla reaching to level of front margin of eye. D XVIII–XX+10–12+5–6. A III 8–10+6. (Plate XXIX, fig. 4.)

Length.—Up to 1000 mm.

Colour.—Silvery, steely or bluish black on the upper parts.

Locality.—From Table Bay northwards to Mossamedes, False Bay to Mossel Bay or as far as Algoa Bay (the eastward extension varies).

Distribution.—Tristan d'Acunha, Australia, Tasmania, New Zealand, Chile. Down to 40 fathoms.

Gen. Gempylus Cuv.

1829. Cuvier, Règne Anim., ed. 2, vol. ii (fide Agassiz. Nom. Zool.).

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 207.

1831. Lesson, Voy. Coquille, Poiss., p. 160 (*Lemnisoma*).

Body very elongate. Spinous dorsal very long, with 30 or more spines, continuous with soft dorsal. Six detached finlets behind both dorsal and anal. Pectoral slightly nearer ventral than dorsal profile. Belly not keeled. Scales almost or quite obsolete. Ventral rudimentary, reduced to a very small spine. Lateral line single.

A single widely distributed species.

Gempylus serpens C. and V.

Snake Mackerel.

1831. Cuvier and Valenciennes, *loc. cit.*, p. 207.

1873. Günther, Fische d. Südsee, vol. i, p. 106, pl. lxviii, fig. B.

1914. Gilchrist, Mar. Biol. Rep., vol. ii, p. 126, fig.

1918. Thompson, *ibid.*, p. 116 (references and synonymy).

Depth 14–17, length of head 5–$5\frac{1}{2}$, in length of body. Eye $3\frac{1}{4}$ in snout, $6\frac{3}{4}$ in length of head. Strong canine teeth in front of upper jaw. D XXX–XXXI 12–13+6. A III 12+6.

Length.—Up to 1000 mm.

Colour.—Uniform silvery, upper part of dorsal fin black.

Locality.—East London.

Distribution.—Tropical Atlantic and Pacific Oceans.

Only a single specimen, now in the South African Museum, has been found in these waters.

Gen. Epinnula Poey.

1854. Poey, Mem. Hist. Nat. Cuba, vol. i, p. 369.

1895. Goode and Bean, Ocean. Ichthyol., p. 198.

Body moderately elongate. Spinous dorsal with 15 spines, contiguous with soft dorsal. Anal arising behind origin of soft dorsal. No finlets. Pectoral slightly nearer ventral than dorsal profile. Ventral well developed. Belly not keeled. Scales minute, deciduous. Lateral line double, the second line running near the ventral profile.

The type species, *magistralis* Poey, is known from the W. Indies.

**Epinnula orientalis* G. and v. B.

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 15, pl. iv, fig. 1.

Depth $3\frac{4}{5}$, length of head $3\frac{1}{10}$, in length of body. Eye 5 in length of head. Maxilla reaching level of middle of eye. Teeth strong anteriorly. D XVI · I 21. A III 19. Scales minute, deciduous, absent from vertical fins (number in l.l. ?). Lateral lines unbranched.

Length.—Up to 235 mm.

Colour.—Uniform (? brownish), anterior dorsal blackish.

Locality.—Off Natal coast and Delagoa Bay, 157–275 fathoms.

Type in coll. Govt. Mar. Survey.

Fam. 2. Trichiuridae.

Body very elongate, strongly compressed. Maxilla sheathed by the preorbital. Spinous dorsal, if distinct, not longer than the soft. Anal with numerous short spines. Ventral fins reduced to a pair of scale-like appendages, or absent. Caudal small or absent. Caudal peduncle not keeled. Pectoral placed low. Strong anterior canines in the jaws. Gill-membranes free from isthmus.

Key to the South African genera.

1. Caudal fin developed.
   - *a.* Pectoral fin broad. Ventral fins behind pectorals . . . *Lepidopus.*
   - *b.* Pectoral slender. Ventral fins under pectorals . . *Benthodesmus.*
2. Caudal absent . . . . . *Trichiurus.*

Gen. Lepidopus Gouan.

1770. Gouan, Hist. Poiss., p. 185.

Body attenuate, band-like. Dorsal uniform, continuous from behind head almost to caudal. Caudal small but well developed. Anal spines numerous but minute. No strong post-anal spine. Ventral represented by a minute scale-like spine situate behind the level of pectoral. Skin naked. Gill-rakers in several series on all the arches.

Lepidopus caudatus (Euphr.).

Scabbard-fish ; Frost-fish ; Kalkvis.

1788. Euphrasen, Vet. Ac. Nya Handl., vol. ix, p. 52, pl. ix, fig. 2.

1914. Gilchrist, Mar. Biol. Rep., vol. ii, p. 125, fig.

1918. Thompson, *ibid.*, vol. iv, p. 114 (references and synonymy).

1918. Strubberg, Dan. Ocean. Exp., vol. ii, A 6, p. 7 (post-larval stages).

Depth about 15½, length of head about 6, in length of body. Eye 5½ in length of head. D 102–104. A 24–25. (Plate XXX, fig. 1.)

Length.—Up to 1600 mm.

Colour.—Uniform silvery, darker bronzy on top of head, dorsal fin with a narrow black margin, iris bronzy brown, pupil black.

Locality.—Table Bay, False Bay, down to 200 fathoms.

Distribution.—Eastern parts of Atlantic Ocean, Mediterranean, South-east Australia, Tasmania, New Zealand.

An excellent food-fish.

Gen. Benthodesmus G. and B.

1881. Goode and Bean, Proc. U.S. Nat. Mus., vol. iv, p. 380.

1895. *Id.*, Ocean. Ichthyol., p. 204.

1915. McCulloch, " Endeavour " Res., vol. iii, pt. 3, p. 152 (sub genus).

Body attenuate. Dorsal uniform, continuous from behind head almost to caudal. Caudal small but well developed. Anal spines short and numerous, preceded by a scale-like appendage. No strong post-anal spine. Ventral represented by a minute scale-like spine, situate under base of pectoral. Skin naked. Gill-rakers in a single series on the 1st and 2nd arches, almost obsolete on 3rd and 4th.

McCulloch regards this at most as a subgenus of *Lepidopus*.

**Benthodesmus atlanticus* G. and B.

1881. Goode and Bean, *loc. cit.*, p. 183, pl. ii (*elongatus* non Clarke).

1895. *Id.*, *loc. cit.*, p. 205, fig. 215.

1917. Gilbert, Smiths. Misc. Coll., vol. lxvi, No. 18, p. 1.

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 16.

Depth of body (at vent) 4 in length of head, which is $7\frac{1}{2}$ in length of body. Eye $\frac{1}{2}$ length of snout, which is $2\frac{1}{2}$ in length of head. D 142–154. A ca. 100.

Length.—Up to 1037 mm.

Colour.—Uniform silvery, head and tail darker.

Locality.—Natal coast, 250 fathoms.

Distribution.—N. Atlantic and W. Indies, 25–208 fathoms; N. Pacific (British Columbia).

As another species (*elongatus* Clarke) is known from New Zealand (Hokitika), and another (*tenuis* Gnthr.) from Japan, it is possible that the Natal specimen is not correctly identified; unless all are really only forms of the same widely distributed species.

Gen. Trichiurus Linn.

1758. Linné, Syst. Nat., ed. 10, p. 246.

Body attenuate, band-like, tapering to a point without caudal fin. Dorsal uniform, continuous from behind head to tail. Anal spines numerous, but minute and scarcely visible. No strong post-anal spine. Ventral fins reduced to a pair of scales, or quite absent. Skin naked.

The species of this genus frequent the shallower and warmer seas, and are often found entering estuaries.

Key to the South African species.

1. D 130 . . . . . *haumela.*
2. D 135 . . . . . *lepturus.*

Trichiurus haumela (Forsk.).

Hair-tail.

1775. Forskal, Desc. Anim., p. 72.

1914. Gilchrist, Mar. Biol. Rep., vol. ii, p. 126, fig.

1918. Thompson, *ibid.*, vol. iv, p. 116 (references).

Depth 15–17, length of head 6–7, in length of body. Eye $2\frac{1}{5}$ in length of snout. D about 130. Interorbital space flat.

Length.—Up to 1300 mm.

Colour.—Silvery, upper parts and the margin of the dorsal fin blackish.

Locality.—Agulhas Bank to Natal, Delagoa Bay, Chinde, down to 36 fathoms.

Distribution.—Indian and E. Indian seas.

Trichiurus lepturus Linn.

1758. Linné, Syst. Nat., ed. 10, p. 246.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 346.

1896. Jordan and Evermann, Fish. N. Amer., vol. i, p. 889.

This species is scarcely distinct from the preceding, but appears to have a slightly greater number of dorsal spines (135–137).

Locality.—Walfish Bay.

Distribution.—Gold Coast and Atlantic Ocean, chiefly in the western parts.

The Walfish Bay specimen and another from the Gold Coast in the South African Museum possess a few more dorsal spines than the specimens from the east coast, and are therefore kept separate. It is very doubtful, however, whether the Atlantic and Indian forms can really be specifically distinct.

Fam. 3. Scombridae.

Body fusiform, moderately elongate and compressed. Spinous dorsal not longer than the soft. Anal with 1–3 feeble spines. Posterior rays of soft dorsal and anal forming detached finlets. Ventral fin of 1 spine and 5 rays, well developed. Pectoral placed high. Caudal peduncle laterally keeled. No canine teeth in jaws. Gill-membranes free from isthmus.

The Scombrid fishes, comprising the true Mackerels, Tunnies, Albacores, are readily distinguished by their general shape and metallic coloration, and the presence of the detached finlets behind the dorsal and anal fins.

They are all swift swimmers, pelagic in habit, and widely distributed.

The majority are of economic importance. Their flesh is firm, oily, and usually more or less reddish in colour.

Key to the South African genera.

I. No groove along the belly.
  A. Caudal peduncle with 2 keels on each side. Dorsal spines 9–12.
    1. Depth of body less than length of head . . . *Scomber.*
    2. Depth of body about equal to length of head . *Rastrelliger.*
  B. Caudal peduncle with a single keel on each side.
    1. Scales absent except on corselet and along lateral line. Dorsal spines 15–16 . . . . . *Gymnosarda.*
    2. Scales over entire body. Dorsal spines 13–26.
      a. Teeth slender. Gill-rakers numerous. Corselet distinct.
        i. Villiform teeth on vomer and palatine. Dorsal spines 13–14.
          α. Pectoral short . . . . . *Thunnus.*
          β. Pectoral long . . . . . *Germo.*
        ii. Vomer toothless. Palatine with one row of strong teeth. Dorsal spines 18–22 . . . . *Sarda.*
      b. Teeth strong. Gill-rakers few. Corselet obscure *Scomberomorus.*

II. A deep groove along belly . . . . . *Gasterochisma.*

Gen. Scomber Linn.

1758. Linné, Syst. Nat., ed. 10, p. 297.

Body rather elongate, somewhat compressed. Caudal peduncle slender, with two small lateral keels on either side. Scales very small, not forming a corselet. Mouth wide ; a single row of small slender teeth in both jaws and on vomer and palatine. Adipose eyelids. Dorsal fins well separated, spinous portion of 9–12 feeble spines. Five to nine finlets behind both dorsal and anal. Pectorals and ventrals small. Gill-rakers long and slender. Pyloric caeca very numerous. Air-bladder small or wanting.

A few widely distributed species, everywhere highly valued as food.

The record of *S. scombrus*, the Common Mackerel of Europe, rests on Bleeker's authority. He gives the name only, and was very probably mistaken. The species does not seem to have been met with by later investigators, and is not accepted here as being found in South African waters.

Scomber colias Gmel.

Cape Mackerel ; Makreel.

1788. Gmelin, Linné, Syst. Nat., vol. i, p. 1329.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 393 (references and synonymy).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 105 (references and synonymy).

1919. Fowler, Proc. U.S. Nat. Mus., vol. lvi, p. 290.

1919. Gilchrist and Hunter, Tr. Roy. Soc. S. Afr., vol. viii, p. 4, pl. i, fig. 6 ; pl. ii, fig. 7 (egg, larva).

Depth $5\frac{1}{4}$–$5\frac{3}{4}$, length of head $3\frac{1}{2}$, in length of body. Eye 4–5 in length of head, $1\frac{1}{2}$ in snout, equal to or slightly greater than interorbital width. D IX+11–12+5. A I 11–12+5. Teeth in jaws and on vomer and palatine. Maxilla reaching to or slightly beyond level of front margin of eye. A translucent area on top of head. Posterior border of eye with large radiating scales. No groove, or a very shallow one, between the two dorsal fins. Gill-rakers 30–33 on lower part of anterior arch, the longest near the bend of arch. Air-bladder present. (Plate XXX, fig. 2.)

Length.—Up to 406 mm.

Colour.—Silvery, iridescent, bluish or greenish above, with blackish wavy streaks and irregular blotches and spots extending slightly below lateral line, black specks on preopercle in more than one row, a black axillary spot.

Locality.—Table Bay, False Bay, Natal.

Distribution.—Both coasts of N. Atlantic, Mediterranean.

The above description is taken entirely from South African specimens, and differs somewhat from other descriptions. The Cape form, however, appears to be indistinguishable from European specimens. The Japanese form (*japonicus*) and the form from the Pacific coast of N. America (*diego*) are apparently also identical ; in which case the species should really bear the name *japonicus* (Houttuyn 1782).

Gen. Rastrelliger J. and S.

1908. Jordan and Starks in Jordan and Dickerson, Proc. U.S. Nat. Mus., vol. xxxiv, p. 607.

Agreeing with *Scomber*, but the body deeper in proportion to length, the scales larger, and the dentition feebler. The chief distinguishing character lies in the gill-rakers, which are very numerous and very long, so that the mouth when opened looks as if it were "full of feathers." There are also osteological differences in the skull, mentioned by Jordan and Starks.

As regards the gill-rakers, *Rastrelliger* bears the same relation to *Scomber* as *Ulua* does to *Caranx*.

Key to the South African species.

1. Gill-rakers 35 on lower part of 1st arch . . . . *microlepidotus.*
2. Gill-rakers 44 on lower part of 1st arch . . . . *brachysomus.*

Rastrelliger microlepidotus Rüpp.

Striped Mackerel.

1803. Russell, Fish. Vizagapatam, vol. ii, p. 28, pl. cxxxvi (*kanagurta*).

1838. Rüppell, Neue Wirb. Fische, p. 38, pl. xi, fig. 2.

1878–88. Day, Fish. India, p. 250, pl. liv, figs. 3–5.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, p. 394 (references and synonymy).

1925. Fowler, J. Bomb. Nat. Hist. Soc., vol. xxx, p. 316.

Depth equal to length of head, $3\frac{1}{2}$ in length of body. Eye about 4 in length of head, $1\frac{1}{2}$ in snout, subequal to interorbital width. D IX–X+11+5. A I 11–12+5. Teeth in jaws minute, none on vomer or palatine. Maxilla reaching to level of middle of eye. No groove between the two dorsals. Gill-rakers about 35 on lower part of arch, the longest situate in middle of lower part of arch. Air-bladder present.

Length.—Up to 300 mm.

Colour.—Silvery, iridescent, dark greenish above, a row of dark spots along base of dorsal and (in adult) some dark longitudinal streaks, 2–3 golden streaks along sides in adult; fins yellowish, dorsal and caudal tipped with black, a dark spot covered by the pectoral.

Locality.—Natal coast.

Distribution.—Indian seas, E. Indies, Philippine Islands, China.

**Rastrelliger brachysomus* Blkr.

1850. Bleeker, Makr., p. 356.

1878–88. Day, Fish. India, p. 251.

1908. Jordan and Dickerson, Proc. U.S. Nat. Mus., vol. xxxiv, p. 609, fig. 3.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 393 (references).

Depth $3\frac{1}{7}$–$3\frac{2}{3}$, length of head $3\frac{3}{4}$, in length of body. Eye $3\frac{4}{5}$–$4\frac{1}{3}$ in length of head, $1\frac{1}{3}$ in snout, $1\frac{1}{4}$ in interorbital width. D X+12+5. A I 11+5. Maxilla reaching to level of posterior third of eye. Gill-rakers 44 on lower part of anterior arch.

Length.—Up to 200 mm.

Colour.—Silvery, dark above, very similar to *S. microlepidotus*, with 2 shining spots above and behind each eye, posterior part of spinous dorsal blackish.

Locality.—Natal coast.

Distribution.—Indo-Pacific seas.

I have seen no specimens of this species, which is very similar in all respects to *S. microlepidotus*. The specimen reported on by Gilchrist and Thompson in 1908 is no longer in the South African Museum collection.

Jordan and Starks (1917, Ann. Carn. Mus., vol. xi, p. 440) identify *brachysomus* with *kanagurta*.

Gen. Gymnosarda Gill.

1862. Gill, Proc. Ac. Nat. Sci. Philad., p. 125.

Body moderately elongate and compressed. Caudal peduncle slender, with a single lateral keel on either side. Scales small, forming a corselet around the anterior part of the body, but entirely absent from other parts of the body. Mouth wide ; a single row of conical teeth in both jaws, bands of villiform teeth (usually) on palatine, no teeth on vomer. Dorsal fins contiguous, spinous portion with 15–16 spines. Seven to eight finlets behind both dorsal and anal. Pectorals and ventrals moderate. Gill-rakers numerous, slender. Pyloric caeca exceedingly numerous. Air-bladder small or absent.

Gymnosarda pelamys (Linn.).

Oceanic Bonito ; Lesser Tunny ; Katunker.

1758. Linné, Syst. Nat., ed. 10, p. 297.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, pt. 1, p. 172, fig. 64.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 110 (references).

Depth about 4, length of head $3\frac{1}{4}$–$3\frac{1}{2}$, in length of body. Eye $6\frac{1}{2}$–$7\frac{1}{2}$ in length of head, 2 in snout, which is sharply conical. Maxilla reaching to level of middle of eye. D XV–XVI 12+8. A I–II 12+7. Gill-rakers 38 on lower part of anterior arch. Lateral line making a distinct bend below the soft dorsal.

Length.—Up to 825 mm.

Colour.—Silvery, bluish black above, 4 brownish longitudinal stripes on each side of the belly below the lateral line.

Locality.—Cape seas.

Distribution.—Tropical and subtropical seas.

The Lesser Tunny is easily distinguished from the Tunny and the true Bonito by the absence of scales on the body, except anteriorly in the region of the corselet. Its chief food consists of Flying-fish.

Gen. Thunnus South.

1817. Cuvier, Règne Anim., p. 313 (*Thynnus*, nom. preocc. Fabricius 1775).

1845. South, Encycl. Metropol., vol. v, p. 620.

Body moderately elongate and compressed. Caudal peduncle slender, with a single lateral keel. Scales small, over the whole body, those on the pectoral region forming a corselet. Mouth moderately wide ; a single row of conical teeth in both jaws, bands of villiform teeth on palatine and vomer. Dorsal fins contiguous, spinous portion with 13–14 spines. Eight to ten finlets behind dorsal and anal. Pectorals and ventrals moderate. Gill-rakers numerous. Pyloric caeca exceedingly numerous. Air-bladder small or absent.

Thunnus thynnus (Linn.).

Tunny.

1758. Linné, Syst. Nat., ed. 10, p. 297.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 58, pl. ccx (*vulgaris*).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 362.

1892. Smitt, Skandin. Fish., p. 97, fig. 28.

1895. Jordan and Evermann, Fish. N. Amer., vol. i, p. 870.

1918. Roule, Bull. l'Inst. Oc. Monaco, No. 345, pp. 1–24 (biology and bibliography).

1926. Jordan and Evermann, Occ. Pap. Calif. Ac. Sci., vol. xii, p. 10.

Depth 4–4$\frac{1}{4}$, length of head 3$\frac{3}{4}$–4, in length of body. Eye 7–8 in length of head, 2$\frac{1}{2}$ in snout. Maxilla not reaching level of front margin of eye. D XIII–XIV 13–14+9–10. A I–II 12+8–9.

Length.—Up to 3000 mm. (10 ft.).

Colour.—Greyish or silvery below, bluish black above.

Locality.—Table Bay, Hout Bay (Cape Peninsula).

Distribution.—Tropical and subtropical Atlantic and Pacific Oceans, Mediterranean.

The Tunny is the largest of the Scombrid fishes, reaching a length of 10 ft. and a weight of 1500 lbs. It is further noteworthy as being the only fish known to be warm blooded.

The flesh of the Tunny, though oily, is excellent, and the Tunny fisheries of the Mediterranean have been of economic importance for centuries. The fishes segregate, especially about spawning time, in large schools, and are chased and herded into nets.

In South African waters it appears to be only an occasional migrant, and is here recorded for the first time. Two specimens are in the South African Museum from the west coast of the Cape Peninsula ; the larger specimen measures 9 ft. to the middle of the caudal fin.

Gen. Germo Jord.

1817. Cuvier, Règne Anim., p. 314 (*Orcynus* non Rafinesque).

1888. Jordan, Proc. Ac. Sci. Philad., p. 180.

Similar in all respects to *Thunnus*, but with the pectoral fin very long and falciform.

Germo alalonga (Gmel.).

Long-finned Albacore ; Germon (France).

1788. Gmelin, Linné, Syst. Nat., p. 1330.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 120, pl. ccxv.

1910. Cunningham, Proc. Zool. Soc. Lond., pt. 1, p. 109, text-fig. 3.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 108 (references and synonymy).

1918. Joubin and Roule, Bull. l'Inst. Oc. Monaco, No. 348, pp. 1–7 (food).

1926. Jordan and Evermann, Occ. Pap. Calif. Ac. Sci., vol. xii, p. 15.

Depth $3\frac{1}{2}$–$3\frac{2}{3}$, length of head $3\frac{1}{4}$–$3\frac{1}{2}$, in length of body. Eye about 6 in length of head, 2 in snout. Maxilla reaching to level of middle of eye. D XIV 14–15+8. A II–III 12+7–8. Pectoral reaching to origin of anal or to end of soft dorsal fin.

Length.—Up to 1000 mm. (40 inches).

Colour.—Silvery below, steely blue above, faint indications of light stripes on sides ; soft dorsal, anal, and the finlets lemon yellow.

Locality.—West coast (Saldanha Bay).

Distribution.—All warm seas.

The flesh is far inferior to that of the Tunny.

Gen. Sarda Cuv.

1829. Cuvier, Règne Anim., vol. ii, p. 199.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 149 (*Pelamys* nom. preocc. Daudin).

Body moderately elongate and compressed. Caudal peduncle slender, with a single lateral keel. Scales small, covering the whole body, and forming a corselet on the pectoral region. Maxilla not concealed by the preorbital. Mouth wide; a single row of rather strong teeth in both jaws and on the palatine, but none on vomer. Dorsal fins separated by a short interspace, spinous portion of 18–22 spines. Eight to nine finlets behind dorsal and anal fins. Pectorals and ventrals moderate. Gill-rakers moderate or strong. Pyloric caeca very numerous. Air-bladder absent.

Key to the South African species.

1. Spinous dorsal XXI–XXII . . . . . *sarda.*
2. Spinous dorsal XVIII . . . . . *chilensis.*

**Sarda sarda* (Bloch).

Bonito.

1793. Bloch, Ichthyol., vol. x, p. 35, pl. cccxxxiv.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 149, pl. ccxvii.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 111 (references and synonymy).

Depth 4, length of head $3\frac{3}{4}$, in length of body. Eye about 7 in length of head, $2\frac{1}{2}$ in snout. Maxilla reaching beyond level of eye. D XXI–XXII+14–16+8–9. A I–II 13+7. Gill-rakers 11–12 on lower part of anterior arch.

Length.—Up to 750 mm.

Colour.—Silvery below, steely blue above, with numerous dark stripes running obliquely forwards and downwards from the back.

Locality.—Cape seas.

Distribution.—Atlantic Ocean.

As a food-fish the Bonito is of no great value.

**Sarda chilensis* (C. and V.).

Pacific Bonito.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 163.

1850. Temminck and Schlegel, Fauna Jap. Poiss., p. 99, pl. lii (*orientalis*).

1858. Girard, Pac. R. R. Survey, vol. x, p. 106 (*lineolata*).

1878–88. Day, Fish. India, p. 253, pl. lvi, fig. 1.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 175.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 321 (*orientalis*, fam. *Scorpididae* sic).

Differs from the preceding species in having: D XVIII+14–16+(6)7–9; A II 10–12+6–9.

Length.—Up to 900 mm.

Colour.—Silvery below, steely blue above, with about nine dark longitudinal streaks.

Locality.—Natal coast.

Distribution.—Indo-Pacific to Japan, California, Hawaiian Islands, and Chile.

Gen. Scomberomorus Lacép.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 292.

1829. Cuvier, Règne Anim., vol. ii, p. 120 (*Cybium*).

Body elongate, but not strongly compressed. Caudal peduncle moderately slender, with a single lateral keel. Scales small, rudimentary, or even absent in parts, not forming a corselet anteriorly. Maxilla not concealed by preorbital. Mouth wide; strong, compressed, conical teeth in both jaws, villiform bands on vomer and palatine. Dorsal fins contiguous, spinous portion with 12–18 feeble spines. Soft dorsal and anal somewhat falcate, each followed by 7–10 finlets. Pectorals moderate. Ventrals small. Gill-rakers few. Air-bladder present.

The fishes of this genus are widely distributed in warm seas, and are variously known as Spanish Mackerel, King-fish, Cavalla, Pintado, Sierra.

Key to the South African species.

1. Finlets 4–5. Dorsal spines 12 . . . . . *flavobrunneus.*
2. Finlets 9–10. Dorsal spines 16.
   - *a.* Sides with vertically elongated spots . . . . *commersoni.*
   - *b.* Sides with longitudinal spots . . . . . *lineolatus.*

**Scomberomorus flavobrunneus* (Smth).

Yellow-brown King-fish.

1849. Smith, Illustr. Zool. S. Afr. Pisces, pl. xx.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 373.

1911. Weber, Fische Aru u. Kei-Ins., p. 31.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 113 (references).

Depth $4\frac{1}{2}$, length of head $3\frac{2}{3}$, in length of body. Eye 5 in length of head. Maxilla reaching to level of anterior third of eye. Teeth of upper jaw much smaller than those in lower jaw. D XII 17+5. A II 13+4. Anal arising below middle of soft dorsal. Scales small, distinct (in dried skin).

Length.—Up to 600 mm.

Colour.—Yellowish brown, head and fins reddish brown, lower jaw and operculum silvery.

Locality.—Cape seas.

Distribution.—Aru Islands, E. Indies.

Type in British Museum.

This fish is stated by Smith to be caught occasionally in Cape seas, but apparently has never been seen in recent years. In the Museum copy of Günther's Catalogue is a mark opposite this species, indicating that a specimen was in the Museum. The specimen, however, is no longer here.

Scomberomorus commersoni (Lacép.).

Commerson's King-fish.

1800. Lacépède, Hist. Nat. Poiss., vol. ii, p. 600, pl. xx, fig. 1.

1878–88. Day, Fish. India, p. 255, pl. lvi, fig. 5.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 395 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 112 (references).

Depth 5–7, length of head 4–$4\frac{1}{2}$, in length of body. Eye $6\frac{1}{2}$ in length of head, $2\frac{1}{2}$ in snout. Maxilla reaching slightly behind level of hind margin of eye. Upper teeth not very much smaller than lower teeth. D XVI–XVII 15–17+9–10. A II–III 12–14+9–10. Anal rising below middle of soft dorsal. Scales mostly absent. Lateral line with a distinct bend below soft dorsal, becoming horizontal below 2nd finlet.

Length.—Up to 1200 mm.

Colour.—Silvery, bluish black above, back and sides with numerous dark, vertically elongated spots, which are more visible in the preserved

than the fresh condition; spinous dorsal dark anteriorly, transparent posteriorly with a black margin, anal dark, pectoral light.

Locality.—East London and Natal coast, extending at certain seasons westwards to Port Elizabeth and Mossel Bay.

Distribution.—Indian seas.

Scomberomorus lineolatus (C. and V.).

Lineolate King-fish; Barracouda (Natal).

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 170.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 395 (references).

Depth equal to length of head, $4\frac{3}{4}$–5 in length of body. Eye $6\frac{1}{2}$–7 in length of head, $2\frac{1}{2}$ in snout. Maxilla reaching to level of hind margin of eye. Upper teeth not very much smaller than lower teeth. D XVI 16+9–10. A II 14+10. Anal arising below middle of soft dorsal. Scales mostly absent. Lateral line gently curving downwards, and becoming horizontal below about the 4th or 5th finlet.

Length.—Up to 1200 mm.

Colour.—Silvery, bluish black above, sides with numerous short longitudinally elongated spots, spinous dorsal dark.

Locality.—Natal coast.

Distribution.—Indian seas, E. Indies.

Gen. Gasterochisma Rich.

1845. Richardson, Ann. Mag. Nat. Hist., vol. xv, p. 346.

1846. *Id.*, Voy. Erebus and Terror, Ichthyol., p. 60.

1889. Günther, Challeng. Rep., vol. xxxi, p. 15 (*Lepidothynnus*).

1903. Lahille, An. Mus. Nac. Buenos Aires, ser. 3, vol. ii, p. 376 (*Chenogaster*).

Body moderately elongate, rather strongly compressed. Caudal peduncle slender, with two lateral keels on each side. Scales moderately large, cycloid, covering the whole body, cheeks, and postorbital part of head. Maxilla not concealed by preorbital. Mouth wide; teeth small, conical, in a single row in both jaws, and in patches on vomer and palatine. Dorsal fins contiguous, spinous portion consisting of 17 long, flexible spines. Anal low, short. Six to seven finlets behind dorsal and anal fins. Pectorals short. Ventrals varying, sometimes very large and broad, folding into a groove along the belly, extending from

the base of ventrals to the vent. Gill-arches with numerous small teeth, but none on tongue. Pyloric caeca numerous.

A single species.

Gasterochisma melampus Rich.

1845. Richardson, *loc. cit.*, p. 346.

1846. *Id.*, *loc. cit.*, p. 60, pl. xxxvii, figs. 1–3.

1889. Günther, *loc. cit.*, p. 15, pl. vi, figs. A, A^1 (*Lepidothynnus huttoni*).

1903. Lahille, *loc. cit.*, p. 376 (*Chenogaster holmbergi*).

1905. *Id.*, *ibid.*, ser. 3, vol. iv, p. 461.

1907. Stead, Add. Fish-fauna N.S. Wales, No. 1, p. 21, pl. vi.

1913. Lahille, An. Mus. Nac. Buenos Aires, vol. xxiv, p. 7, text-fig. 2 and pls. 3, 4 (*boulengeri*).

1913. Waite, Tr. N. Zeal. Inst., vol. xlv, p. 220, pl. viii (references).

Depth $3\frac{1}{2}$–$3\frac{3}{4}$, length of head 4, in length of body. Eye $6\frac{1}{4}$–7 in length of head, $2\frac{1}{2}$–3 in snout. Maxilla reaching about to level of centre of eye. D XVII 10–11+6–7. A II 10+6–7. Pectoral $1\frac{1}{3}$ (S.A. Mus. specimen) to $1\frac{3}{4}$ (Stead) in length of head. Ventral $2\frac{1}{2}$ (Richardson) or $2\frac{4}{5}$ (Stead) to 6 (S.A. Mus.) or 8 (Günther). Scales : l.l. 80 ; l.tr. $\frac{8\text{–}9}{15\text{–}16}$ (S. A. Mus.). (Plate XXX, fig. 3.)

Length.—Up to 1650 mm. ($5\frac{1}{2}$ ft.).

Colour.—Silvery white below, bluish black above, ventral fins black.

Locality.—Table Bay.

Distribution.—New Zealand, New South Wales, Tasmania, Argentine.

A fine specimen of this species was caught in Table Bay in 1920, measuring 3 ft. 7 in. in length, and is now mounted in the South African Museum. It constitutes the only record of this Australasian fish in South African waters.

In the young, up to about 16 in. in length, the ventral fins are very large, as described by Richardson and Stead ; but in the adult they are of more normal proportions. The only description of an adult is that of Günther, under the name *Lepidothynnus*, based on a skeleton and some notes and a drawing of a New Zealand specimen. Günther's description applies well to the Cape specimen, except that he states that the spinous and soft dorsals are well separated. This statement is probably due to erroneous observation on the part of Günther's correspondent. Unfortunately, the Cape specimen was caught while I was away in England, and I am thus unable to give any details as to the gill-rakers and other anatomical features.

Fam. 4. Xiphiidae.

Sword-fishes.

Body elongate, compressed, with a long-pointed rostrum formed by the nasals and the united premaxillae. Rostrum depressed. Lower jaw in the young also produced, but not equalling the rostrum in length. Maxilla with an expanded anterior and a rod-like posterior portion. Two dorsal fins (united in the young), spines feeble and scarcely differentiated from the rays, second dorsal and anal short, the latter divided in adult. No detached finlets. No anal spines. Ventral fins absent. Pectoral fins placed low. Caudal peduncle with one lateral keel. No teeth in adult. Scales absent in adult; skin in young covered with rough granulations. Gill-membranes free from isthmus. Gills of peculiar structure, the laminae of each arch being united into a single plate by reticulations. Air-bladder present. Pyloric caeca very numerous.

A single, large pelagic species, a strong swimmer, and very pugnacious. The Sword-fish is found in all warm seas, and in many localities is regularly hunted, as its flesh, though dark in colour and oily, is excellent. There are numerous accounts of its ferocity in attacking ships and boats, both with and even without any provocation. It feeds on other fishes such as mackerel, bonitos, etc., which swim together in shoals.

Gen. Xiphias Artedi.

1738. Artedi, Gen. Pisc., p. 29.

1758. Linné, Syst. Nat., ed. 10, p. 248.

1923. Nicholls, Amer. Mus. Nov., No. 94, p. 1 (*Phaetonichthys* non Blkr. 1879, = young).

With the family characters.

Xiphias gladius Linn.

Sword-fish.

1758. Linné, *loc. cit.*, p. 248.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 255, pls. ccxxv, ccxxvi, ccxxxi.

1881. Goode, Proc. U.S. Nat. Mus., vol. iv, p. 428 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 119 (references).

1823. Nicholls, *loc. cit.*, p. 1, fig. (*Phaetonichthys tuberculatus* = young).

1924. Regan, Ann. Mag. Nat. Hist., (9), vol. xiii, p. 224, fig. (young).

1926. Jordan and Evermann, Occ. Pap. Calif. Ac. Sci., vol. xii, p. 71, pl. xx.

Depth 4–4½ in length of body (from point of lower jaw). Length of rostrum (to anterior border of eye) about 1⅔–2 in distance from eye to base of caudal fin. Rostrum flattened, with trenchant edges. D ca. 40+4. A ca. 18+4. Dorsal elevated in young; the middle part both of dorsal and anal becoming low or disappearing altogether in older individuals. (Plate XXX, fig. 4.)

Length.—Up to 12 ft.

Colour.—Silvery white below, deep purplish blue above.

Locality.—Cape seas.

Distribution.—Atlantic, Mediterranean, Southern Pacific (Honolulu, New Zealand).

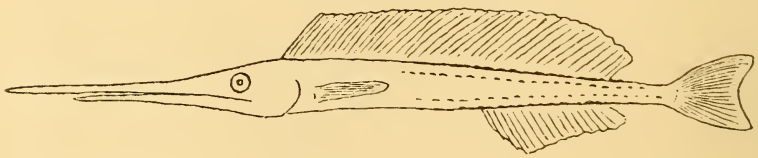


Fig. 27.—*Xiphias gladius*, young example nearly 200 mm. in length. (After Regan.)

The Sword-fish appears to be very rare in our waters. The South African Museum possesses a skull with rostrum and lower jaw, which appears to be the one referred to in 1831 by Cuvier and Valenciennes as having been sketched by Quoy and Gaimard. Castelnau refers to it again in his 1861 Memoire, p. 42. No other record apparently exists of the presence of the Sword-fish in South African waters.

Fam. 5. Histiophoridae.

Sail-fishes; Spear-fishes.

Resembling the *Xiphiidae* in most respects, but with ventral fins consisting of 1–3 rays, rounded (in section) rostrum, rudimentary teeth, scales, caudal peduncle with 2 lateral keels, and maxilla of nearly equal width throughout its length.

Three genera, two of which are represented in South Africa.

In habits the Sail-fishes are very similar to the Sword-fish, but they do not appear to have the same reputation for ferocity as the latter.

Key to the South African genera.

1. Ventral rays 2–3. Dorsal fin single, elevated . . . *Histiophorus.*
2. Ventral rays 1. Dorsal fin double . . . . . *Makaira.*

Gen. Histiophorus Lacép.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 374 (*Istiophorus*).

Skin covered with elongate scales. Dorsal fin single, very high, with numerous rays. Anal fin double. Ventral consisting of 2–3 elongate rays. Pectoral short. Numerous tooth-like asperities on the jaws.

Histiophorus gladius (Brouss.).

Sail-fish.

1786. Broussonet, Mem. Ac. Sci., p. 454, pl. x.

1831. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. viii, p. 293, pl. ccxxix (*indicus*).

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 42 (*granulifer*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 118 (references).

1921. McCulloch, Rec. Austr. Mus., vol. xiii, pt. 4, p. 137, pl. xxiv, fig. 1.

1926. Jordan and Evermann, Occ. Pap. Calif. Ac. Sci., vol. xii, p. 38.

Depth about $6\frac{1}{2}$–7 in length of body (from point of lower jaw). Rostrum (to anterior border of eye) $2\frac{2}{3}$–3 in distance from eye to base of caudal fin. Rostrum subcylindrical, granulate laterally and on lower surface. Mandibles with similar granules. D 42–50+7. A 10–12+6–7. Dorsal fin much higher than body. Upper profile of head straight or nearly so.

Length.—Up to $12\frac{1}{2}$ ft.

Colour.—Silvery white below, deep bluish above, membrane of dorsal fin spotted.

Locality.—Cape seas, St. Sebastian Bay.

Distribution.—Indian seas.

Type of *granulifer* (skull with rostrum and lower jaw) in South African Museum.

The only records of this species in South African waters are based on a specimen in the British Museum and Castelnau's *granulifer*.

The Sail-fish is frequently observed swimming near the surface with its dorsal fin projecting out of the water, whence its name of Sail-fish.

Gen. Makaira Lac.

1803. Lacépède, Hist. Nat. Poiss., vol. iv, p. 688.

Body with scale-like scutes, covered by the skin. Two dorsal and anal fins. Only the anterior dorsal rays elongate, the rest short. Ventral consisting of a single slender ray, shorter than pectoral. Numerous asperities on the jaws.

**Makaira herscheli* (Gray).

Herschel's Spear-fish.

1838. Gray, Ann. Nat. Hist., vol. i, p. 313, pl. 10.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 118.

1926. Jordan and Evermann, Occ. Pap. Calif. Ac. Sci., vol. xii, p. 69.

Depth 5–6 in length of body (from point of lower jaw). Rostrum (to anterior border of eye) about 3 in distance from eye to base of caudal fin. Rostrum subcylindrical, granulate on sides and below. Mandibles similarly granulate. D 35–42+7. A 11–12+6–7. Anterior dorsal rays not, or but little, exceeding the height of the body, posterior rays much shorter. Upper profile of head more or less arcuate.

Length.—Up to 13½ ft.

Colour.—Silvery or greyish below, bluish above, margin of dorsal and tip of pectoral often blackish.

Locality.—Table Bay, East London.

Type of *herscheli* in British Museum.

An excellent photograph of the East London specimen appeared in the *Cape Times*, weekly edition, 19th June, 1907.

Group GOBIOIDEI.

Gobies.

1911. Regan, Ann. Mag. Nat. Hist., (8), vol. viii, p. 729, (classification).

Body naked or scaly. Spinous dorsal, when present, of a few flexible spines. Anal similar to soft dorsal, without or with a feeble spine. Ventrals thoracic or subjugular, each with a weak spine and 4–5 rays. Gill-membranes attached to isthmus. No bony stay for the preoperculum. A more or less developed anal papilla, larger in males. No lateral line. No pyloric caeca. Air-bladder usually absent.

The Gobies form a large group. They are mostly small fishes, carnivorous and marine. Some are found in estuaries and rivers; two species are known to descend below the 100-fathom line. The majority are littoral, and the typical forms with united ventral fins are easily distinguished.

Key to the South African families.

1. Ventral fins completely separate . . . . . *Eleotridae.*
2. Ventral fins united either at base only, or completely, forming a sucking disc *Gobiidae.*

Fam. 1. Eleotridae.

Ventral fins separated, their bases not contiguous. Two dorsal fins. Soft dorsal and anal free from caudal, which is rounded. Pectorals well developed, upper rays without free filaments. Teeth in a single row, or in bands, with or without canines. Gill-rakers long or reduced. Scales cycloid or ctenoid.

Gen. Eleotris Gron.

1754. Gronovius, Mus. Ichthyol., p. 16.
1763. *Id.*, Zooph., p. 83.
1801. Bloch Schneider, Syst. Ichthyol., p. 65.
1918. Fage, Dan. Ocean. Exp., vol. ii, A 3, p. 99 (post-larval stages).

Teeth small, conical, the outer series enlarged, with or without canines; none on vomer. Scales moderate or small, cycloid or ctenoid. Gill-rakers more or less reduced. Pseudobranchiae more or less reduced. No barbels.

This genus has been variously subdivided, but so far as the South African fauna is concerned, it is quite unnecessary.

Coasts and rivers between the tropics. Boulenger (Freshwater Fishes of Africa, vol. iv, 1916) records 14 species from African rivers.

Key to the South African species.

1. A strong spine at angle of preopercle, concealed beneath the skin. Scales: l.ser. 60–78 . . . . . *fusca.*
2. No preopercular spine.
   - *a.* Body strongly compressed . . . . . *butis.*
   - *b.* Body feebly compressed.
     - i. Scales: l.ser. 35–42 . . . . . *ophiocephalus.*
     - ii. Scales: l.ser. 28 . . . . . *delagoensis.*

Eleotris fusca (Bl. Schn.).

1801. Bloch Schneider, Syst. Ichthyol., p. 453.

1878–88. Day, Fish. India, p. 313, pl. lxv, fig. 7.

1916. Boulenger, Freshwater Fish. Africa, vol. iv, p. 21, fig. 14 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 401 (references).

Body feebly compressed. Depth 4–4⅔, length of head 3–3¼, in length of body. Head broader than deep. Eye 4½ (young)–7 in length of head, 1–2 in interorbital width, equal to or rather less than snout. Maxilla extending to below centre or posterior third of eye. No canine teeth. A strong spine at angle of preopercle, projecting downwards and forwards, concealed beneath the skin. D VI+I 8. A I 8. P 18. Scales ctenoid: l.ser. 60–78; tr.ser. 17–21. Head scaly, except on snout and chin. Gill-rakers 10 on lower part of anterior arch, very short. Pseudobranchiae reduced.

Length.—Up to 260 mm.

Colour.—Dark brown or blackish, vertical fins mottled or banded.

Locality.—Natal and east coast of Africa.

Distribution.—Indo-Pacific.

**Eleotris butis* (Ham.-Buch.).

1822. Hamilton-Buchanan, Fish. Ganges, p. 57.

1878–88. Day, Fish. India, p. 315, pl. lxvii, fig. 3.

1916. Boulenger, Freshwater Fish. Afr., vol. iv, p. 10, fig. 6 (references).

Body strongly compressed. Depth 4⅓–5, length of head 2⅔–3, in length of body. Head much depressed, broader than deep. Eye 5–6½ in length of head, ⅔ (young) or ½ length of snout, 1–1⅔ in interorbital width. Maxilla extending to below anterior third or centre of eye. No canine teeth. No preopercular spine. D VI+I 8. A I 8. Scales ctenoid: l.ser. 29–32; tr.ser. 10–11. Head almost entirely scaly, with finely serrated ridges above and a groove on each side behind eye.

Length.—Up to 135 mm.

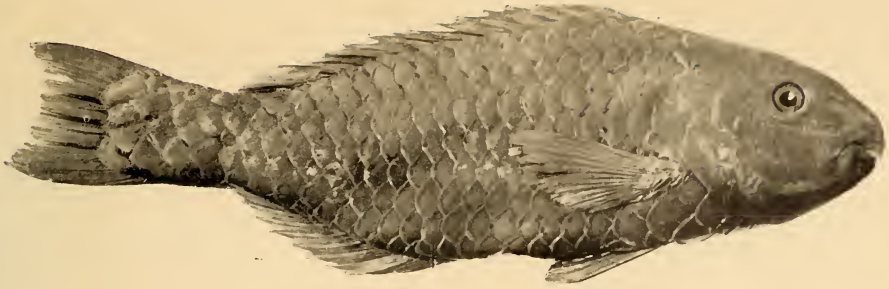
Colour.—Brownish, soft dorsal and caudal spotted, anal with dark margin edged with white, 1st dorsal dark, a light or scarlet spot divided by a black mark on base of pectoral.

Locality.—Mozambique.

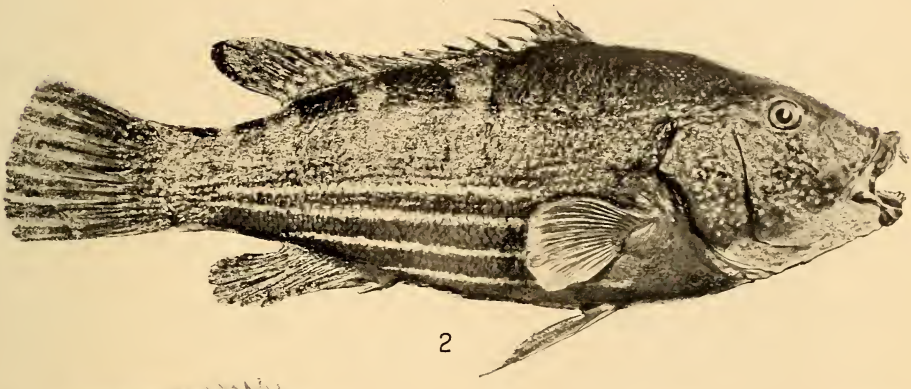
Distribution.—East coast of Africa, Indian seas, Malay Archipelago.

PLATE XXXII.

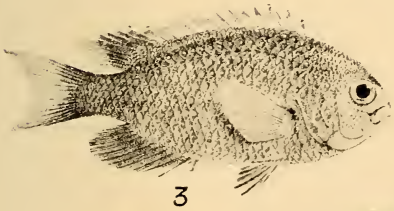
FIG.		TEXT-PAGE
1.	*Scarus guttatus* Bl. Schn (original photo)	773
2	*Anchichoerops natalensis* (G. and T.) (original photo)	747
3	*Pomacentrus sindensis* (Day) (after Day)	735
4	*Halidesmus scapularis* Gnthr. (after Gnthr.)	870
5.	*Gobius nudiceps* C. and V. (original photo)	816
6.	*Eleotris ophiocephalus* C. and V. (after Day)	811



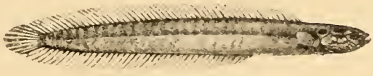
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2



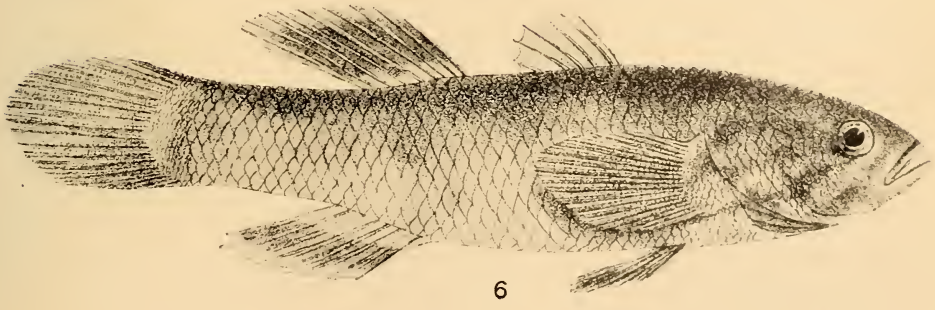
3



4



5



6

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**Eleotris ophiocephalus* C. and V.

1837. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xii, p. 239.

1878–88. Day, Fish. India, p. 312, pl. lxvii, fig. 2.

1916. Boulenger, Freshwater Fish. Afr., vol. iv, p. 15, fig. 10 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 401 (references).

Body feebly compressed. Depth 4–5, length of head 3–4, in length of body. Head broader than deep. Eye $4\frac{1}{2}$–6 in length of head, equal to or $1\frac{1}{2}$ in snout, $1\frac{2}{3}$–$2\frac{1}{2}$ in interorbital width. Maxilla extending to below anterior third or centre of eye. No canine teeth. No preopercular spine. A series of papillae in a groove below mandible. D VI+I 8. A I 7–8. Scales ctenoid : l.ser. 35–42 ; tr.ser. 12–14. Head scaly, except front part of snout. (Plate XXXII, fig. 6.)

Length.—Up to 260 mm.

Colour.—Dark brown or blackish, with or without yellowish spots, blotches, or irregular cross-bars ; soft dorsal and caudal spotted, anal with light edge.

Locality.—Zululand and east coast of Africa.

Distribution.—Indo-Pacific.

Eleotris delagoensis n. sp.

Body moderately compressed. Depth $4\frac{1}{3}$, length of head 3, in length of body. Head about as broad as deep. Eye $4\frac{1}{2}$ in length of head, slightly smaller than snout, slightly greater than interorbital width. Maxilla extending to below anterior third of eye. No canine teeth. No preopercular spine. D VI+I 8. A I 9. P 21, longer than ventrals. Scales ctenoid : l.ser. 28 ; tr.ser. 9. Head scaly, except on interorbital, snout, suborbital, and mandibles. First gill-cleft reduced in size. Gill-rakers 13 on lower part of anterior arch, moderately developed. Pseudobranchiae well developed. A row of small spiniform cutaneous projections on supraorbital, continued on to snout. Rows of papillae : 6 vertical rows below eye, with a horizontal row below them, around lower edge of preopercle, and in a groove below mandible.

Length.—58 mm.

Colour.—Brownish, with irregular darker mottling ; dorsals and anal dark, the latter with light margin.

Locality.—Delagoa Bay.

Type in South African Museum.

This species is easily distinguished by the large scales and the rows of papillae on the head.

Fam. 2. Gobiidae.

Gobies.

Ventral fins either completely united to form a sucking disc or united only at their bases, or at least their bases contiguous. Two dorsal fins, the soft dorsal and anal free from caudal ; or a single dorsal which, like the anal, is confluent with caudal. Pectorals well developed, the upper rays sometimes free, silk-like, filamentous. Teeth in a single row or in bands, with or without canines. Scales cycloid or ctenoid.

A large family containing a multitude of forms which have been ranged in numerous genera. Many authorities further subdivide some of the genera, but the limits of many of these genera and subgenera are but ill-defined. Until further studies of large collections containing abundant material have been made, especially from the Indo-Pacific region, it is better not to proceed too far with generic subdivisions. The relatively small number of South African species renders such subdivision quite unnecessary for practical purposes.

Key to the South African genera.

I. Two dorsal fins.
  A. Body scaly.
    1. Pectoral fins and eyes normal . . . . . *Gobius.*
    2. Pectoral fins with strong muscular bases. Eyes prominent, erectile *Periophthalmus.*
  B. Body scaleless (apparently) . . . . . *Gobiosoma.*

II. A single dorsal fin, confluent with caudal, as is also the anal fin *Ctenotrypauchen.*

Gen. Gobius Art.

1792. Artedi, Gen. Pisc., p. 28.

1918. Fage, Dan. Ocean. Exp., vol. ii, A 3, p. 61 (dermal papillae and post-larval stages).

Body more or less elongate, compressed behind, but usually more or less cylindrical in front. Head often broad and somewhat depressed. Eye high up, but not erectile. Teeth in both jaws, in 1 or more rows, simple, some of the outer ones often enlarged, canines sometimes present. Two dorsals, more or less close together, the 1st with 6 weak spines. Soft dorsal and anal rays less than 14, free from caudal. Pectoral normal, its upper rays sometimes free, silk-like. Ventrals not

adnate to the belly. Scales moderate or small. Head more or less naked, cheeks naked, opercle often so. Muciferous pores or papillae in series and groups on various parts of head.

The very numerous species of *Gobius* have been distributed among many subgenera or genera, the limits of which are often ill-defined. No satisfactory classification has yet been proposed, on account of the perplexing gradation of forms. The genus *Gobius* is here construed in a very wide and general sense. Some of the more clearly defined subgeneric names have been added in brackets.

So far as is known all Gobies lay demersal eggs, which they attach to stones, shells, and other objects. The eggs are usually elongate-oval in shape, and in some cases the male has been observed to guard them until hatched. See Gilchrist, Mar. Biol. Rep., vol. iii, p. 11, fig. 7, 1916 (*G. nudiceps*), and Tr. Roy. Soc. S. Afr., vol. viii, p. 5, pl. i, fig. 8, 1919 (*Gobius* sp.).

Gobies are mostly small fishes, usually very abundant in rock-pools along the shore. In South Africa the species are more abundant in Natal than towards the Cape, and there are doubtless many species belonging to the Indo-Pacific fauna which await discovery along the Natal and Zululand coast.

Some Gobies are said to be poisonous. They have no special poison apparatus, however, and it is doubtful whether their bite is any more poisonous than that of other fishes.

Key to the South African species.

I. Without barbels.
  A. Caudal fin rounded, little if at all longer than head.
    1. Upper pectoral rays not silk-like.
      a. Dorsal and anal branched rays 7–9.
        i. Rays 8–9. Scales : l.ser. 30–36 . . . *giuris.*
        ii. Rays 9. Scales : l.ser. 26 . . . . *dewaali.*
        iii. Rays 7. Scales : l.ser. 38 . . . *durbanensis.*
      b. Dorsal and anal rays 10–13 (occasionally 9).
        i. Scales : tr.ser. 14–22.
          α. Lower jaw projecting.
            * Body nearly cylindrical . . *nudiceps.*
            ** Body moderately compressed *melanocephalus.*
          β. Upper jaw projecting over lower. Fresh water *aeneofuscus.*
        ii. Scales : tr.ser. 9–12.
          α. Dorsal rays 12. Scales : l.ser. 31 *capistratus.*
          β. D 9–10. Scales : 26–28 . . . *criniger.*
          γ. D 10–11. Scales : 44–46 . . . *agulhensis.*

2. Upper pectoral rays silk-like.
   a. Dorsal rays 8–9. Scales : tr.ser. 12–14 . . *fuscus.*
   b. Dorsal rays 10–11. Scales : tr.ser. 10 . . . *saldanha.*

B. Caudal lanceolate, longer than head.
   1. Dorsal spines filiform, elongate . . . . *acutipennis.*
   2. Dorsal spines not filiform.
      a. A low crest on nape . . . . . *nuchalis.*
      b. No crest . . . . . *signatus.*

II. With barbels.
   A. Two barbels on chin. No ocellus on tail . . . *bibarbatus.*
   B. A series of barbels or cutaneous flaps along lower jaws. An ocellus on tail . . . . . *polynema.*

G. platynotus Gnthr. (1861, Cat. Fish. Brit. Mus., vol. iii, p. 66) is not included. It is based on a specimen in the British Museum from an unknown locality, and the only reason for suggesting that it may be South African is that the specimen was presented by Sir A. Smith.

Gobius (*Glossogobius*) *giuris* Ham.-Buch.

Flat-head Goby.

1822. Hamilton-Buchanan, Fish. Ganges, p. 51, pl. xxxiii, fig. 5.

1878–88. Day, Fish. India, p. 294, pl. lxvi, fig. 1.

1897. Weber, Zool. Jahrb. Syst., vol. x, p. 144 (*spectabilis*).

1916. Boulenger, Freshwater Fish. Afr., vol. iv, p. 24, fig. 15 (references).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 402 (references).

1917. *Id.*, *ibid.*, p. 403 (*spectabilis*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 129 (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 262.

(Non von Bonde, Fish. Mar. Surv. Spec. Rep., i, 1923, p. 28, as *spectabilis*).

Body cylindrical or feebly compressed. Depth $4\frac{1}{3}$–$5\frac{1}{2}$, length of head 3–$3\frac{1}{3}$, in length of body. Head broader than deep. Snout depressed. Eye $4\frac{1}{2}$ (young)–$7\frac{1}{2}$ in length of head, $1\frac{1}{3}$ (young)–$2\frac{1}{2}$ in snout, equal to interorbital width in adult. Lower jaw projecting. Maxilla extending to below anterior margin or anterior third of eye. Teeth conical, in narrow bands, outer strongly enlarged and widely spaced. D VI+I 9. A I 8. Upper rays of pectoral not filamentous. Ventrals with broad basal membrane, not reaching to vent. Caudal rounded, as long as but rarely longer than head. Scales ctenoid ; l. series 30–36 ; tr. series 9–11. Head scaleless except on occiput.

Horizontal rows of fine papillae across cheeks. Tongue bilobed. No shoulder flaps. Gill-rakers obsolete.

Length.—Up to 320 mm.

Colour.—Brown or olivaceous, with large dark blotches, usually forming a regular series along each side, with or without dark longitudinal streaks, pectoral, dorsal, and caudal spotted or barred.

Locality.—Algoa Bay to Natal, Zululand, and east coast of Africa, entering lagoons, estuaries, and fresh water. The South African Museum has specimens from the Sabi River Game Reserve.

Distribution.—Madagascar, Indian seas, Malay Archipelago, South China.

G. spectabilis Gnthr. is based on large examples (? male) with extra long caudal fins (Weber, Siboga Exp. Monogr. 57, p. 468, 1913).

**Gobius dewaali* Weber.

Dewaal's Goby.

1897. Weber, Zool. Jahrb. Syst., vol. x, p. 145.

1916. Boulenger, Freshwater Fish. Afr., vol. iv, p. 26.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 402.

Depth $4\frac{1}{4}$, length of head nearly $3\frac{1}{2}$, in length of body. Eye nearly 4 in length of head, greater than snout. Interorbital space very narrow. Mouth subinferior. Maxilla extending to beyond posterior margin of eye. Teeth in 2 series, with a curved canine on each side of lower jaw. D VI+I 9. A I 9. P 13. Ventrals reaching vent. Caudal rounded. Scales ctenoid : l.ser. 26 ; tr.ser. 10. Head naked except on gill-cover.

Length.—40 mm.

Colour.—Yellowish brown, with large dark spots forming a zig-zag band on each side ; dorsal and anal fins with dark spots ; a deep black spot on hinder third of 1st dorsal.

Locality.—Umgeni and Illovo Rivers, Natal, far inland ; mangrove swamps, Durban.

This species is distinguished from all other South African Gobies by the very wide mouth.

Gobius durbanensis n. sp.

Durban Goby.

Body moderately compressed posteriorly. Depth $4\frac{3}{4}$, length of head $3\frac{1}{4}$, in length of body. Head broader than high, breadth $1\frac{1}{3}$ in

length. Eye $4\frac{3}{4}$ in length of head, equal to snout, rather less than interorbital width. Jaws subequal. Maxilla extending to below centre of eye. Teeth villiform, no canines. D VI+I 7, the two fins narrowly separated. A I 7. P 16, upper rays not filamentous. Ventrals not reaching vent. Caudal rounded, shorter than head. Scales ctenoid: l.ser. 38; tr.ser. 12. Scales extending forwards on head to behind eyes and on upper part of opercle, rest of head naked. Obscure series of papillae on cheeks, preopercle, and opercle, and a series round edge of preopercle continued on to lower surface of mandible. No flap on shoulder girdle. Tongue free, rounded. Gill-rakers and pseudobranchiae reduced.

Length.—45 mm.

Colour (as preserved).—Brown, with irregular darker cross-bands, the hindmost one being on base of caudal; 1st dorsal with a blackish band and a light margin; other fins grey.

Locality.—Durban Bay.

Type in South African Museum.

This species is close to the Madagascar *G. simplex* Sauv. in the fin and scale formulae, but differs in the broader head and interorbital, and absence of canines.

Gobius nudiceps C. and V.

Common Goby; Dikkop.

1837. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xii, p. 65.

1861. Castelnau, Mem. Poiss. l'Afr. Austr., p. 55.

? 1861. *Id.*, *ibid.*, p. 55 (*olivaceus*).

? 1861. *Id.*, *ibid.*, p. 55 (*capensis*).

1874. Günther, Ann. Mag. Nat. Hist., (4), vol. xiv, p. 453 (*caffer* and *natalensis*).

1897. Weber, Zool. Jahrb. Syst., vol. x, p. 144 (*gymnauchen* non Blkr.).

1898. Boulenger, Mar. Invest. S. Afr., vol. i, p. 8 (*gilchristi*).

1916. *Id.*, Freshwater Fish. Afr., vol. iv, p. 27, fig. 16 (*gilchristi*).

1916. *Id.*, *ibid.*, p. 28.

1916. Gilchrist, Mar. Biol. Rep., vol. iii, p. 11, fig. 7 (eggs).

1918. Thompson, *ibid.*, vol. iv, p. 129 (*gilchristi*).

1918. *Id.*, *ibid.*, p. 131 (references).

1918. Regan, Ann. Durban Mus., vol. ii, pt. 2, p. 77 (*natalensis*).

Body cylindrical or feebly compressed. Depth 4–5, length of head $3–3\frac{1}{2}$, in length of body. Head $1\frac{1}{4}–1\frac{1}{3}$ as long as broad. Snout convex.

Eye 4–5 in length of head, 1 (young)–1⅓ in snout, 1–1½ times interorbital width. Lower jaw projecting. Maxilla extending to below anterior margin or anterior third of eye. Teeth in bands, the outer ones usually more or less enlarged. D VI+I 10–13, the two fins contiguous. A I 9–11. P 19, upper rays not filamentous. Ventrals with a broad basal membrane, which has a short process on each side, sometimes reaching vent, but usually not. Caudal rounded, shorter than head. Scales ctenoid : l.ser. 55–61 ; tr.ser. 18–22. Head naked. Anterior part of back in front of 1st dorsal more or less naked. Base of pectoral fin more or less scaly. Vertical and horizontal series of papillae on cheek, a series round lower margin of preopercle, continued (in a groove) on lower surface of mandible. Gill-rakers reduced to knobs. Tongue rounded. No flaps on shoulder-girdle. (Plate XXXII, fig. 5.)

Length.—Up to 165 mm.

Colour.—Brownish or olivaceous, with dark spots and marbling, which usually combine to form more or less regular cross-bars ; 1st dorsal with dark streaks, 2nd dorsal spotted, the spots usually forming streaks ; caudal frequently spotted, anal usually plain, pectoral sometimes spotted, usually with a black band, edged with white, at base ; usually a black scapular spot above the axil, margins of both dorsals whitish.

Locality.—Table Bay, False Bay to East London and Natal ; estuaries, rock-pools, and shallow water.

Types of *caffer*, *natalensis*, and *gilchristi* in British Museum.

This species is the common Goby along the south coast. Examination of a large series shows that *G. gilchristi* cannot be maintained as a distinct species, nor even as a variety. The scaling in front of the 1st dorsal is a very variable feature. Even if maintained as a variety, it is questionable whether the name should not give place to Castelnau's *capensis*.

Although the dorsal spines can never, strictly speaking, be called filaments, their tips frequently project a short distance beyond the membrane, and Castelnau evidently considered this a specific feature.

Previous writers, I believe, have been led astray by the thick mucus, which in preserved material frequently covers the head and anterior parts of the body, and thus conceals the scales in front of the 1st dorsal and on the bases of the pectorals. Preservation also has the effect sometimes of contracting the interorbital skin, thus producing an apparently narrower interorbital space. In young specimens, of course, the interorbital is naturally narrow.

The Dikkop is very common in the rock-pools around the Cape Peninsula and along the south coast; it is much rarer in Natal, where its place is taken by the Indo-Pacific species.

The eggs are elongate-oval, 1·8 mm. by ·54 mm., and are attached in groups by one end to the under-surface of rocks, shells, and other suitable objects.

Gobius melanocephalus Blkr.

Spotted Goby.

1849. Bleeker, Verh. Bat. Gen., vol. xxii, p. 33.

1849. *Id.*, *ibid.*, p. 34 (*personatus* and *grammepomus*).

1861. Steindachner, SB. Ak. Wien, vol. xlii, p. 289 (*litturatus*).

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, pp. 64, 554 (*grammepomus*).

1878–88. Day, Fish. India, p. 292, pl. lxiii, fig. 6 (*personatus*).

1913. Weber, Siboga Exp. Monogr. 57, p. 465.

1914. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xiii, pt. 3, p. 81 (*malabaricus* non Day).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 403 (*malabaricus* non Day).

Body moderately compressed. Depth $4\frac{3}{4}$, length of head $3\frac{1}{2}$, in length of body. Head $1\frac{1}{2}$ times as long as broad. Eye $4\frac{2}{3}$ in length of head, twice the interorbital width, nearly equal to snout. Lower jaw slightly projecting. Maxilla reaching to below anterior third of eye. Teeth with the outer series enlarged; no canines. D VI+I 10. A I 9–10. Upper pectoral rays not silk-like. Ventrals nearly reaching vent. Caudal rounded, shorter than head. Scales ctenoid: l.ser. 50–55; tr. ser. 14–16. Whole head and space in front of 1st dorsal naked, upper part of opercle sometimes scaly. Vertical and horizontal series of papillae on cheek, a ⊨ -shaped series on lower half of opercle, a series on lower edge of preopercle continued (in a groove) on lower surface of mandible. Tongue rounded. Gill-rakers much reduced. No flaps on shoulder-girdle.

Length.—Up to 130 mm.

Colour.—Brownish or greenish, head and body with dark spots and irregular vermiculate streaks; both dorsals with rows of dark spots, caudal spotted, pectoral with a dark curved band on upper half at base.

Locality.—Natal coast.

Distribution.—Indian seas, East Indies.

Gobius (*Awaous*) *aeneofuscus* Peters.

River Goby.

1852. Peters, MB. Ac. Berl., p. 681.

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 61.

1868. Peters, Reise Mossamb., vol. iv, p. 18, pl. iii, fig. 1.

1891. Sauvage, Hist. Madagasc. Poiss., p. 376, pl. xxxviii, fig. 1 (*banana* non C. and V.).

1916. Boulenger, Freshwater Fish. Afr., vol. iv, p. 30, fig. 17.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

Body cylindrical or feebly compressed. Depth 5–6, length of head $3\frac{2}{5}$–$3\frac{4}{5}$ in length of body. Head $1\frac{1}{2}$ to nearly 2 times as long as broad, broader than deep. Snout with convex profile. Eye 4 (young)–7 in length of head, equal to interorbital width in adult, $2\frac{1}{2}$ in snout. Mouth subinferior. Maxilla extending to, or nearly to, below anterior margin of eye. Teeth villiform, in narrow bands. D VI+I 10. A I 10. Upper rays of pectoral not silk-like. Ventrals with broad basal membrane, ending some distance from vent. Caudal rounded, shorter than head. Scales ctenoid: l.ser. 58–64; tr. ser. 16–18. Head naked. Gill-rakers short, 5–6 on lower part of anterior arch. Tongue obsolete. Two flaps on shoulder-girdle.

Length.—Up to 250 mm.

Colour.—Olivaceous brown or greenish above, bronzy on sides, white below, with more or less distinct dark mottling; 2 dark oblique lines from eye to mouth; 2nd dorsal and caudal spotted or barred.

Locality.—Sabi and White Rivers, Transvaal; Pietermaritzburg and Durban, Natal; Senna and Tette on Zambezi River.

Distribution.—Fresh waters of East Africa and Madagascar.

**Gobius capistratus* Peters.

1855. Peters, Wiegm. Archiv., p. 251.

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 36.

1891. Sauvage, Hist. Madagasc. Poiss., p. 356, pl. xxxviii, fig. 5.

1898. Jatzow and Lenz, Abh. Senckenb. Ges., vol. xxi, p. 507.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

Depth $4\frac{1}{2}$, length of head $3\frac{1}{2}$, in length of body. Eyes very close together, about $3\frac{1}{2}$ in length of head. Snout short, convex. Maxilla reaching to below anterior border of eye. Teeth in the outer series enlarged; 2 canines on each mandible. D VI+I 12. A I 12.

Upper pectoral rays not filamentous. Ventrals reaching origin of anal. Caudal rounded. Scales : l.ser. 31 ; tr.ser. 9.

Length.—62 mm.

Colour.—Greenish, with 5 brown cross-bars on back, scales more or less distinctly white-spotted ; a brown vertical band through eye ; pectoral dotted with white, anterior part of spinous dorsal and caudal spotted.

Locality.—Natal coast and Ibo, Portuguese East Africa.

Distribution.—Zanzibar. Not yet recorded from Madagascar, though figured in Sauvage's work.

Closely allied, according to Günther, to *ophthalmotaenia* Blkr., which is synonymous with *cauerensis* Blkr. (see Weber, Siboga Exp. Monogr. 57, p. 460, 1913).

Gobius criniger C. and V.

1837. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xii, p. 82.

1855. Peters, Wiegm. Arch., p. 254 (*atherinoides*).

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 18 (*atherinoides*).

1878–88. Day, Fish. India, p. 288, pl. lxii, fig. 2.

1891. Sauvage, Hist. Madagasc. Poiss., p. 353 (*atherinoides*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 262.

Body moderately compressed. Depth 5–5½, length of head 3½–3¾, in length of body. Head as high as broad, 1½ times as long as broad. Eye 3½–3⅔ in length of head, slightly larger than snout. Interorbital very narrow. Jaws subequal, or lower slightly longer. Snout convex. Maxilla reaching to below anterior margin of eye. Teeth villiform, the outer series enlarged ; no canines. D VI+I 9–10. A I 9–10. Upper pectoral rays not filamentous. Ventrals reaching to, or nearly to, vent. Caudal rounded, shorter than head. Scales ctenoid : l.ser. 26–28 ; tr.ser. 9–10. Head and space in front of 1st dorsal naked. Horizontal series of papillae on cheek, preopercle, opercle, and postorbital ; a series around lower edge of preopercle continued on lower surface of mandible. Tongue rounded. Gill-rakers reduced. No shoulder flaps.

Length.—Up to 112 mm.

Colour.—Greenish, with large irregular dark blotches, the last at base of caudal fin, both dorsal fins and caudal with rather large spots, anal light with blackish margin, ventrals dark grey.

Locality.—Delagoa Bay, Mozambique coast.

Distribution.—Indian seas, East Indies to N. Australia.

It seems fairly evident that *atherinoides* Peters is synonymous. The

above description is taken from Delagoa Bay specimens collected by myself, and differs a little from the descriptions of Day and Fowler, namely, in the absence of canines and the slightly fewer scales.

Gobius agulhensis n. sp.

Body feebly compressed. Depth 5–5½, length of head 3⅕–3½, in length of body. Head 1⅓ times as long as broad, a little broader than high. Eye 4 in length of head, about equal to snout. Interorbital space very narrow. Jaws subequal. Maxilla reaching to below anterior margin of eye. Teeth with the outer series enlarged; no canines. D VI+I 11, the two fins narrowly separated. A I 10. P 21, upper rays not filamentous. Ventrals reaching to, or nearly to, vent. Caudal rounded, shorter than head. Scales ctenoid: l.ser. 44–46; tr.ser. 11–12. Head, whole area in front of 1st dorsal, and base of pectoral, naked. Vertical and horizontal series of papillae on cheek and opercle, a series round lower edge of preopercle continued (in a groove) on to lower surface of mandible. A small flap on front margin of shoulder-girdle usually present. Tongue free, apically rounded. Gill-rakers reduced to 6–7 knobs on anterior arch. Pseudobranchiae moderately developed.

Length.—Up to 90 mm.

Colour (as preserved).—Light brown, with darker irregular blotches on sides, sometimes forming more or less definite cross-bars, 1st dorsal faintly barred, with (in adult) a black blotch between 4th and 6th spines, 2nd dorsal faintly spotted, anal usually grey, ventrals often dusky.

Locality.—False Bay, St. Sebastian Bay, Mossel Bay, off East London, 20–40 fathoms.

Type in South African Museum.

Gobius (*Mapo*) *fuscus* Rüpp.

Fuscous Goby.

1828. Rüppell, Atl. Reise N. Afr. Fisch., p. 137.

1828. *Id.*, *ibid.*, p. 138 (*punctillatus*).

1837. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xii, p. 57 (*albopunctatus*).

1837. *Id.*, *ibid.*, p. 58 (*nebulopunctatus*).

1855. Peters, Wiegm. Archiv., p. 250 (*obscurus*).

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 17 (*obscurus*).

1861. *Id.*, *ibid.*, p. 25 (*albopunctatus*), and p. 26 (*nebulopunctatus*).

1866. Steindachner, Verh. Zool. Bot. Ges. Wien, p. 780, pl. xviii, fig. 6 (*obscurus*).

1876–81. Günther, Fisch. d. Südsee, vol. ii, p. 172, pl. cx, fig. A (*albopunctatus*).

1878–88. Day, Fish. India, p. 294, pl. lxiii, fig. 7 (*albopunctatus*).

1891. Sauvage, Hist. Madagasc. Poiss., p. 359, pl. xxxviii, fig. 2 (*obscurus*).

1891. *Id.*, *ibid.*, p. 361, pl. xxxviii, fig. 3 (*albopunctatus*).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, pt. 1, p. 483, fig. 212 (*Mapo fuscus*) (references).

1913. Weber, Siboga Exp. Monogr. 57, p. 466 (references) (synonymy).

1914. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xiii, pt. 3, p. 80 (*obscurus*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 403 (*obscurus*).

1917. Regan, *ibid.*, vol. i, pt. 5, p. 459 (*nebulopunctatus*).

1919. *Id.*, *ibid.*, vol. ii, pt. 4, p. 200 (*albopunctatus*).

Body cylindrical or feebly compressed. Depth 5–6, length of head $3\frac{1}{5}$–$4\frac{2}{3}$, in length of body. Head longer than broad. Eye $3\frac{3}{4}$ (young)–5 in length of head, $1\frac{1}{5}$–$1\frac{1}{2}$ in snout, equal to interorbital width in adult. Jaws subequal, or upper slightly overhanging lower. Maxilla reaching to below anterior border of eye. Teeth villiform, the outer slightly enlarged; no canines. D VI+I 8–9, contiguous. A I 8–9. Upper pectoral rays free, filamentous. Ventrals reaching to, or nearly to, vent. Caudal rounded, shorter than head. Scales cycloid, or feebly ctenoid posteriorly: l.ser. 35–42; tr.ser. 12–14. Head naked. Horizontal series of papillae across cheek (sometimes very faint), a series round lower edge of preopercle, continued (in a groove) on lower surface of mandible. Tongue bilobed. Gill-rakers short. No shoulder flaps.

Length.—Up to 95 mm.

Colour.—Blackish or olivaceous brown, with obscure dark spots or marbling, usually with longitudinal series of small whitish spots, both dorsal fins and the caudal usually with dark spots, more or less arranged in bands.

Locality.—Natal coast, Delagoa Bay, Mozambique.

Distribution.—Indo-Pacific. Jordan and Evermann state that they can find no differences between Hawaiian specimens of this species and the West Indian species *soporator* C. and V.

Gobius saldanha n. sp.

? 1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 28 (*spectabilis* non Gnthr.).

Body moderately compressed. Depth 5, length of head $3\frac{1}{2}$, in length of body. Head longer than broad. Eye 4 in length of head, equal to snout, twice the interorbital width. Jaws about equal (specimen preserved with jaws open). Maxilla reaching to below anterior margin of eye. Teeth villiform, none enlarged; no canines. D VI+I 11, contiguous. A I 10. P 19+ca. 5, the upper rays filamentous. Ventrals reaching origin of anal fin. Caudal rounded, shorter than head. Scales ctenoid : l.ser. 35–36; tr.ser. 10. Head, whole area in front of 1st dorsal, and bases of pectorals naked (only a few small scales on chest in advance of ventrals). Groups of papillae on cheek, postorbital, and opercle, a series round edge of preopercle continued (in a groove) on to lower surface of mandible; 2 larger papillae in median line on interorbital. No flap on shoulder-girdle. Tongue rounded, apparently adnate (but this may be due to the specimen having been preserved with the mouth widely expanded). Gill-rakers short, 6–7 on lower part of anterior arch. Pseudobranchiae moderately developed.

Length.—85 mm.

Colour (as preserved).—Light brown, both dorsals, anal, and ventrals dusky.

Locality.—Saldanha Bay, low tide.

Type in South African Museum.

This species would appear to have some affinity with *G. jozo* from the Mediterranean and the coast of Morocco and Mauretania.

Von Bonde's identification of a specimen also from Saldanha Bay as *spectabilis* Gnthr. (=*giuris*, Ham.-Buch.) is probably erroneous; the specimen possibly belongs to this species.

Gobius acutipennis, C. and V.

1837. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xii, p. 80.

1837. *Id.*, *ibid.*, p. 81 (*setosus*).

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 44 (*acutipinnis* sic).

1878–88. Day, Fish. India, p. 291, pl. lxi, fig. 2 (*acutipinnis* sic).

Body rather compressed. Depth 4–$4\frac{1}{2}$, length of head $3\frac{3}{4}$–4, in length of body. Head higher than broad; height $\frac{4}{5}$ length. Eye 4 in length of head, equal to or slightly less than snout, twice or 3 times the interorbital width. Jaws subequal, or upper slightly overhanging lower. Maxilla reaching to below centre or posterior third of eye. Teeth

villiform; no canines. D VI+I 10–11, 1st dorsal high, the spines weak and filamentous, the longest (4th) $\frac{1}{2}$ length of body. A I 11. Upper pectoral rays not silk-like. Ventrals reaching to vent. Caudal lanceolate, longer than head. Scales ctenoid: l.ser. 25–28; tr.ser. 6–7. Whole head and area in front of dorsal fin naked. A series of papillae across cheek, opercle, and postorbital, a series round lower edge of preopercle, continued on to under surface of mandible. Tongue rounded-truncate. Gill-rakers reduced. No shoulder flaps.

Length.—Up to 95 mm.

Colour.—Brownish, lighter below, with darker blotches along sides, the last at base of caudal; a brown band (bluish in life) from eye to angle of mouth, dorsal fins with grey bands and dark dots, caudal, especially the central rays, with dark bands or spots; anal and ventrals grey.

Locality.—Natal coast.

Distribution.—Andaman Islands and Indian seas.

Gobius (*Oxyurichthys*) *nuchalis* n. sp.

Long-tailed Goby.

Body compressed. Depth 5–5$\frac{1}{2}$, length of head 3$\frac{2}{3}$–3$\frac{3}{4}$, in length of body. Head rather higher than broad, height 1$\frac{1}{2}$ in length. A low longitudinal crest from occiput to 1st dorsal. Posterior rim of orbit prominent, a transverse groove behind it. No tentacles. Eye 3$\frac{1}{2}$ (young)–4 in length of head, 1–1$\frac{1}{3}$ in snout, 3–4 times the interorbital width. Snout blunt, profile abruptly descending. Upper jaw slightly overlapping lower. Cleft of mouth nearly horizontal. Maxilla reaching to below posterior third or posterior margin of eye. Teeth conical, in a single series in both jaws, but with 2–3 behind front row at symphysis of lower jaw; no canines. D VI+I 12–13, contiguous or almost so. A I 13. P 22, upper rays not silk-like. Ventrals reaching to vent, the margin of basal membrane fimbriate. Caudal lanceolate, longer than head. Scales ctenoid, except those on temporal region: l.ser. ca. 50 (no complete series remains on any of the specimens); tr.ser. 12. Scales extending on to the temporal region nearly to hind margin of eye, but leaving base of the nuchal crest bare. Series of papillae on preorbital, postorbital, occipital, cheek, preopercle, and opercle, a series round edge of preopercle continued on to lower surface of mandible. No flaps on shoulder-girdle. Tongue free, rounded. Gill-rakers 6 on lower part of anterior arch. Pseudobranchiae 2–3 filaments.

Length.—Up to 110 mm.

Colour (as preserved).—Pinkish brown, eyes black, dorsals, pectoral, and caudal hyaline, but with indications of spots on 2nd dorsal and of a dark spot on hind part of 1st dorsal; anal and ventrals dusky.

Locality.—Zululand coast, 36–42 fathoms.

Type in South African Museum.

This species is closely related to *G. cristatus* Day, and *tentacularis* C. and V. From the former it differs in having ctenoid scales, and from the latter in the absence of the orbital tentacle. From both it is distinguished by the abrupt profile, the horizontal mouth, and the lower jaw being slightly included in the upper.

**Gobius* (*Oxyurichthys*) *signatus* Peters.

1855. Peters, Wiegm. Archiv., p. 253.

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 45.

1891. Sauvage, Hist. Nat. Madagasc. Poiss., p. 362, pl. xxxviii, fig. 4.

1898. Jatzow and Lenz, Abh. Senckenb. Ges., vol. xxi, p. 508.

Depth 5, length of head 4, in length of body. Head rather higher than broad. Snout very slightly convex. Eye 4 in length of head, equal to snout, twice interorbital width. Teeth with the outer series enlarged. D VI+I 10. A I 10. Upper pectoral rays not silk-like. Caudal lanceolate, as long as or longer than head. Scales ? ctenoid : l.ser. 30; tr.ser. 8–9. Head naked.

Length.—Up to 72 mm.

Colour.—Greenish, with irregular dark blotches, sides of head with bluish spots, a large blackish-blue ocellus between 5th and 6th dorsal spines, pectorals and caudal white-spotted, anal with indistinct basal white spots, ventrals dusky.

Locality.—Mozambique.

Distribution.—Zanzibar.

As Weber remarks (Siboga Exp. Monogr. 57, p. 479, 1913), this species and *longimanus* Weber from the East Indies are closely related, the small number of scales being an unusual feature in a species of the subgenus *Oxyurichthys*.

Gobius bibarbatus von B.

Bearded Goby.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 28, pl. vi.

Body moderately compressed. Depth 4½–5 (young), length of head

3, in length of body. Head slightly higher than broad. Eye 4 (young)–5 in length of head, equal to snout, twice interorbital width in young, slightly larger than it in adult. Snout convex. Lower jaw projecting. Maxilla reaching to below centre of eye. Teeth in bands, some of them enlarged; no canines. D VI+I 13, contiguous. A I 13. Upper pectoral rays silk-like. Ventrals reaching to vent. Caudal rounded, shorter than head. Scales ctenoid: l.ser. 56–58; tr.ser. 15–16. Head, but not the nape, naked. Vertical and horizontal series of papillae on cheek and opercle, a series round edge of preopercle continued on to lower surface of mandible; 2 pores in median line on interorbital space. Two short barbels on chin. A flap on shoulder-girdle. Tongue free, rounded-truncate. Gill-rakers 8 on lower part of anterior arch. Pseudobranchiae moderate.

Length.—Up to 130 mm.

Colour.—Yellowish or brownish, scales dotted with greenish, opercle purplish; dorsals, anal, and caudal purplish with darker cross-bars, pectorals and ventrals dusky; some preserved specimens have irregular dark blotches on sides.

Locality.—St. Helena Bay, Saldanha Bay, and St. Sebastian Bay, 28–50 fathoms.

Type in coll. Govt. Marine Survey.

The pair of barbels on the chin serves to distinguish this species at once from all other South African Gobies.

Gobius (*Parachaeturichthys*) *polynema* Blkr.

Spot-tailed Goby.

1853. Bleeker, Verh. Batav. Gen., vol. xxv, p. 44, fig. 4.
1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 46.
1878–88. Day, Fish. India, p. 286, pl. lxi, fig. 8.
1901. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxiv, p. 103.
1925. Fowler, J. Bombay Nat. Hist. Soc., vol. xxx, pt. 3, p. 649.
1925. *Id.*, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 262.

Body moderately compressed. Depth $5\frac{1}{4}$–$5\frac{2}{3}$, length of head $3\frac{4}{5}$–$4\frac{1}{3}$, in length of body. Head about as high as broad. Eye 4 in length of head, about equal to snout, twice (young) or $1\frac{1}{2}$ times the interorbital width. Jaws about equal. Maxilla extending to below anterior margin or anterior third of eye. Teeth villiform, the outer ones slightly enlarged; a small canine on either side of lower jaw sometimes present. D VI+I 11. A I 9–10. Pectoral longer than head, upper rays not silk-like. Ventrals reaching nearly to vent. Caudal

lanceolate, longer than head. Scales cycloid anteriorly, ctenoid posteriorly: l.ser. 28–30; tr.ser. 8–9. Scales extending forwards on to interorbital, cheeks, and opercles. Horizontal series of papillae on cheeks, a series round edge of preopercle continued on to lower surface of mandible. A series of small irregular cutaneous flaps or barbels along lower surface of mandibles. Pseudobranchiae and gill-rakers reduced, the latter about 8 on lower part of anterior arch. Tongue rounded. No shoulder flaps.

Length.—Up to 150 mm.

Colour.—Purplish brown, fins dusky or blackish; an oval, black, white-edged ocellus on upper part of caudal fin near base.

Locality.—Zululand coast, 12–26 fathoms, Delagoa Bay.

Distribution.—Indian seas, China, Japan.

This species is easily recognised by the ocellus on the caudal fin.

Gen. Periophthalmus Bl. Schn.

1801. Bloch Schneider, Syst. Ichth., p. 63.

Body subcylindrical, more or less elongate. Head large. Eyes high up, very close together, erectile, outer eyelid very well developed. Mouth horizontal, upper jaw overlapping lower. Teeth in 1 or 2 rows in both jaws, moderate, conical, vertical. Two dorsal fins, 1st with 4–15 flexible spines. Second dorsal and anal free from caudal. Caudal with lower margin obliquely truncated. Bases of pectorals very muscular. Ventrals not adnate to belly, their bases always joined, but their tips more or less separate. Scales moderate or small, cycloid or feebly ctenoid. Head naked, but with small scales on occiput and opercles. Bases of pectorals scaly. Muciferous pores not conspicuous. No barbels on chin. Gill-opening narrow. Pseudobranchiae obsolete.

This genus is confined to the tropics, and occurs on the West African coast and throughout the Indo-Pacific region. Three or four species and numerous varieties, mostly colour varieties, are known.

These little fishes, known as Skipping or Jumping Gobies, are remarkable for their amphibious mode of life. They spend a considerable time out of water, clinging by means of their strong pectoral fins to rocks or the roots and trunks of mangrove trees, though they never wander far from water. When disturbed they make a sudden jump, and skim along the surface of the water by a series of little jumps, finally disappearing below the surface or into a hole in the mud.

They obtain their scientific name from the pair of very prominent, erectile, goggle-like eyes, which enable them to obtain an extensive

survey around them. They feed on crabs and various insects, including flies and mosquitoes, and are extraordinarily active in their movements.

From their habit of keeping the caudal fin out of the water when sitting on rocks, it has been suggested that respiration is to a large extent performed by the tail (Haddon, Nature, vol. 39, 1889, p. 285), though no more recent experiments appear to have been carried out.

A good coloured figure of one of these Gobies is given by Hickson (1889, A Naturalist in Celebes, frontispiece), and an account of their burrowing habits by Petit (1922, Bull. Mus. d'Hist. Nat. Paris, No. 6, p. 404).

Periophthalmus koelreuteri Pall.

Skipping Goby.

1769. Pallas, Spic. Zool., vol. viii, p. 8, pl. ii, fig. 1.

1878–88. Day, Fish. India, p. 303, pl. lxiv, fig. 8.

1891. Sauvage, Hist. Nat. Madagasc., p. 520, pl. xl A, fig. 4.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 403 (references and synonymy).

Depth 5–6, length of head $3\frac{4}{5}$–$4\frac{1}{4}$, in length of body. Eye 4 in length of head. Maxilla reaching to below anterior third of eye. Snout with 2 triangular fleshy flaps overhanging upper lip. Teeth in a single row; no canines. D XVI+I 11–12; 1st dorsal spine not produced. A I 11. Ventrals almost entirely separated. Scales cycloid: l.ser. 80–90. Gill-rakers obsolete.

Length.—Up to 130 mm.

Colour.—Brownish, olivaceous, or bluish, with white or bluish dots on head and along sides of body; both dorsal fins with whitish dots near base, and a black band parallel with the white margin; anal light, caudal and pectorals sometimes spotted with brown.

Locality.—Natal coast, Delagoa Bay, Quilimane.

Distribution.—Indo-Pacific and west coast of Africa.

This species is subject to considerable variation in colour and markings. The number of spines in the 1st dorsal also varies from 10–16. Specimens from West Africa are stated to be identical with those from the Indo-Pacific.

Gen. Gobiosoma Gir.

1859. Girard, Proc. Ac. Nat. Sc. Philad, 1858, p. 169.

Body elongate, cylindrical. Head somewhat depressed. Eyes high

up. Mouth horizontal or oblique, lower jaw often projecting. Teeth villiform or cardiform; no canines. Two dorsal fins, 1st with 6–8 flexible spines. Second dorsal and anal free from caudal. Bases of pectorals normal. Ventrals not adnate to belly, their bases contiguous, but the rays separate. Scales usually absent; if present, moderate, cycloid. Head naked. Muciferous pores not conspicuous. No barbels. Gill-opening rather narrow. Pseudobranchiae obsolete.

These small Gobies are distinguished from the true Gobies by the absence of scales, though some individuals sometimes have scales. Klunzinger has suggested that the scaly and naked individuals may be the two sexes of one and the same fish. From an examination of specimens in the South African Museum, I am more inclined to suspect that the alleged absence of scales is more apparent than real. Like most Gobies, these fishes exude a thick mucus when preserved, and this may easily hide the scales so effectually that the skin appears naked. Gentle scraping, however, reveals the presence of the scales, which lie very closely to the body.

A more certain difference between *Gobiosoma* and *Gobius* lies in the separation of the rays of the ventral fins, which are not united into a disc or cup as in *Gobius*.

East and west coasts of N. America, West Indies, east coast of Africa, East Indies.

Gobiosoma diadematum Rüpp.

1828. Rüppell, Atl. Fische, pp. 137, 138.
1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 85.
1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 483.
1919. Regan, Ann. Durban Mus., vol. ii, pt. 4, p. 200.

Depth $5\frac{1}{2}$, length of head 4, in length of body. Head depressed, broader than high. Eye $4\frac{3}{4}$–5 in length of head, $1\frac{1}{3}$ in snout, about equal to interorbital width. Snout conical. Mouth oblique, lower jaw projecting. Maxilla reaching to below anterior margin of eye. D VI+I 11–12. A I 10. Caudal rounded. Scales: l.ser. ca. 45 (but difficult to count); tr.ser. ca. 13. Gill-rakers obsolete. Tongue rounded-truncate.

Length.—Up to 55 mm.

Colour.—Greyish, a dark oblique band from eye towards angle of opercle, a dark cross-band below 1st dorsal fin, and other more or less distinct cross-bands further back, the last across base of tail; dorsals dark with yellow margins, anal with a dark border, caudal with yellow margin, pectorals reddish.

Locality.—Natal coast.
Distribution.—Red Sea.

Gen. Ctenotrypauchen Stndnr.

1867. Steindachner, SB. Ak. Wiss. Wien, vol. lv, p. 530.
1924. Hora, Rec. Ind. Mus., vol. xxvi, pp. 158, 159.
1926. *Id.*, *ibid.*, vol. xxviii, p. 221.

Body elongate, compressed. Head short, compressed, profile bluntly rounded. Eyes very small. Mouth small, oblique, lower jaw projecting. Teeth in two or three rows in both jaws, the outer series enlarged; no canines. A single dorsal fin confluent (like the anal) with the caudal, which is pointed. Pectorals small. Ventrals united, but with a distinct notch posteriorly. Scales small, cycloid, separate anteriorly, but more or less imbricated posteriorly. Head naked. Mucous pores distinct. A deep pit above the opercle opening into a cavity distinct from the gill-cavity. Gill-opening moderate. Pseudobranchiae and gill-rakers obsolete. No barbels.

The small eyes, pit above the opercle, and the confluent vertical fins at once distinguish this genus from all the other South African Gobies. It ranges from Japan, China, and the East Indies to Natal. Three other allied genera are also found in the Indo-Pacific region.

Ctenotrypauchen barnardi Hora.

1914. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xiii, p. 82 (*Trypauchen vagina* non Bl. Schn.).
1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 404 (*Trypauchen vagina* non Bl. Schn. Not the references).
1926. Hora, *loc. cit.*, p. 221, text-figs. 1, 2.

Body compressed. Depth $7\frac{1}{5}$–$9\frac{1}{5}$, length of head $5\frac{1}{2}$–$5\frac{4}{5}$, in length of body. Snout $3\frac{1}{3}$–4 in length of head. Maxilla extending to below anterior margin of eye. Lower jaw slightly projecting. D VI 46–51. A I 44–47. Scales: l.l. 65–70; l.tr. 12. Head naked.

Length.—Up to 130 mm.

Colour.—Uniform pale pinkish, becoming whitish or brownish when preserved.

Locality.—Natal coast, Delagoa Bay, 2–14 fathoms, on muddy bottom.

Type in South African Museum.

Group BLENNIOIDEI.

Blennies.

(1912. Regan, Ann. Mag. Nat. Hist., (8), vol. x, p. 265, classification).

Body naked or scaly. Spinous dorsal developed or absent. Anal with or without spines. Ventrals jugular or mental, often reduced or absent. No bony stay for the preoperculum.

The Blennies and Blenny-like fishes form a large group containing littoral, shallow-water, and deep-water species. In shape they are mostly elongate or eel-like, with the ventral fins far forward, and often reduced to filaments.

Key to the South African families.

I. Ventrals (if present) jugular.
  A. Caudal fin free.
    1. Spinous and soft dorsal subequal . . . *Blenniidae.*
    2. Spinous dorsal longer than soft dorsal . . . *Clinidae.*
  B. Caudal confluent with dorsal and anal.
    1. Lips strongly developed. Littoral . . . *Congrogadidae.*
    2. Lips not strongly developed. Deep-sea.
      a. Gill-membranes more or less broadly united to isthmus *Zoarcidae.*
      b. Gill-membranes free from isthmus . . *Brotulidae.**
  C. Caudal and ventral fins absent. Vent at throat . . *Fierasferidae.*
II. Ventrals between rami of lower jaw, each reduced to a pair of filaments *Ophidiidae.*

* *Hoplobrotula* has the ventrals inserted between the rami of lower jaw, and in this respect resembles the *Ophidiidae.*

Fam. 1. Blenniidae.

Body elongate, naked. Mouth not protractile, maxilla almost or quite excluded from upper jaw. A single series of slender close-set teeth, like a comb, in each jaw, within which canines may be developed. Palate usually toothless. Spinous and soft portions of dorsal fin about equal. Anal with 1 or 2 spines. Caudal free (except in *Xiphasia*, *Enchelyurus*). Ventrals jugular, with 1 spine and 2–4 rays. Pseudobranchiae present.

Mostly small-sized fishes inhabiting shallow waters, though some descend to deep water, in tropical and temperate regions. The majority are carnivorous and oviparous. In some cases parental care of the eggs has been observed.

Key to the South African genera.

I. Caudal free.
  A. Teeth fixed.
    1. Gill-opening wide . . . . . *Blennius.*
    2. Gill-opening reduced to a small foramen.
      a. Gill-opening above root of pectoral . . *Petroscirtes.*
      b. Gill-opening extending in front of pectoral . *Aspidontus.*
  B. Teeth movable . . . . . *Salarias.*
II. Caudal united with vertical fins. Body eel-shaped . . . *Xiphasia.*

Gen. Blennius (Art.) Linn.

1738. Artedi, Gen. Pisc., p. 27.

Body oblong, compressed. Snout short, profile of head bluntly rounded. Cleft of mouth small, horizontal. A curved canine tooth on each side in both jaws, or lower jaw only, in addition to the comb-like series of immovably fixed teeth ; canines sometimes absent. Gill-opening wide. Gill-membranes typically forming a fold across the throat, but in *B. capito* united to isthmus without forming a fold. Dorsal fin entire, more or less notched, between spinous and soft portions. Tentacles above orbits, more or less developed, sometimes absent. No pyloric caeca. Lateral line often developed only on the anterior part of the body, consisting of a single line of short tubes, or in the anterior part of a double row of pores, each pair of pores being connected by a (more or less distinct) transverse groove. Pseudobranchiae present.

If a revision of all the species of this genus were undertaken, the characters of the lateral line and the gill-membranes might well be used to differentiate new genera. So far as the South African fauna is concerned, this is unnecessary at present.

Key to the South African species.

I. Lateral line a single row of tubes. A pair of tentacles on nape . *bifilum.*
II. Lateral line anteriorly a double row of pores.
  A. Gill-membranes forming a fold across throat.
    1. Nasal tentacle, if present, short.
      a. No ocellus on dorsal fin.
        i. Supraorbital tentacle long. Throat not barred *cornutus.*
        ii. Supraorbital tentacle short. Throat with dark bars *fascigula.*
      b. An ocellus on dorsal fin.
        i. Ocellus between 1st and 2nd dorsal spines.
          α. An occipital (filamentous) crest *punctifer* and *cristatus.*
          β. No occipital crest . . . . *scu'lyi.*
        ii. Ocellus between 3rd and 5th dorsal spines . *ocellatus.*

2. Nasal tentacle long . . . . . *hypenetes.*
B. Gill-membranes joined to isthmus, not forming a continuous fold across throat . . . . . *capito.*

Blennius bifilum Gnthr.

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, pp. 225, 561.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 414 (references).

Depth 5–5¾, length of head 4½–4¾, in length of body. Eye 1⅓ in snout, 3¾–4 in length of head, 1½ times interorbital width. Profile of head very abruptly descending. A simple short nasal tentacle ; no orbital tentacle. A pair of slender tapering tentacles on the nape. No canine teeth. D XI–XII 18–19, commencing above end of operculum, slightly notched. A 20–22, 1st ray short, not tuberculous. Lateral line anteriorly a series of short, longitudinal tubes, obsolete posteriorly. Gill-membranes united across throat.

Length.—Up to 75 mm.

Colour.—Greyish, with 7–8 dark cross-bands and scattered small pearly ocellate spots ; dorsal and caudal with dark spots, arranged more or less in rows.

Locality.—Coast of Natal and Zululand.

Type in British Museum.

Blennius cornutus (Linn.).

Common Cape Blenny ; Bijter.

1754. Linné, Mus. Ad. Fried., p. 61.

1916. Gilchrist, Mar. Biol. Rep., vol. iii, p. 11, fig. 9 (eggs and nesting habits).

1918. Thompson, *ibid.*, vol. iv, p. 145 (references).

1919. Regan, Ann. Durban Mus., vol. ii, pt. 4, p. 202.

Depth about equal to length of head, 3¾–4 in length of body. Eye 1¾ in snout, 5 in length of head, 1½ times interorbital width. Profile of head abruptly descending. A deep transverse groove behind orbits. A short, fimbriate nasal tentacle ; a tapering tentacle, with a group of shorter filaments at its base, above each eye, in ♂ extending to commencement of dorsal fin, in ♀ considerably shorter. Curved canine teeth in both jaws, those in lower jaw larger than those in upper jaw. D XII 17–20, commencing above hind margin of preopercle, slightly notched. A II 19–22, the 1st two spines in ♂ covered with thick

spongy skin. Lateral line anteriorly a double series of pores. Gill-membranes united across throat, forming a fold. (Plate XXXV, fig. 1.)

Length.—Up to 140 mm.

Colour.—Dark brown or chestnut, sometimes faint lighter bars or patches, belly lighter, anal fin with dark margin, lower rays of pectoral pinkish or yellowish; body sometimes with traces of dark marbling or spots.

Locality.—Table Bay, False Bay, Knysna to Algoa Bay and Natal.

Blennius fascigula n. sp.

Depth $4\frac{1}{2}$, length $3\frac{1}{2}$, in length of body. Eye $2\frac{1}{2}$ in length of head, $1\frac{1}{2}$ times interorbital width, greater than snout. Profile of head very abruptly descending. Nasal tentacle short, fringed; supraorbital tentacle very short, $\frac{1}{3}$ diameter of eye, fringed. No occipital crest. No canines visible. D XII 23, commencing above hind margin of preopercle, not notched, not joined to caudal. A II 20. Lateral line anteriorly a double row of pores. Gill-membranes forming a fold across throat.

Length.—40 mm.

Colour (as preserved).—Light brown, with 5 dark transverse bars, extending on to dorsal and anal, head and pectoral fin dotted, 3 transverse dark angular bands across throat and one across chin, a dark cross-bar on caudal.

Locality.—" Pieter Faure " collection, without precise locality.

Type in South African Museum.

This little specimen does not seem to agree with any of the described species. It has the banded throat found in *tentacularis* Brünn. and *paro* Risso from the Mediterranean, and by this character is easily distinguished from the other South African species.

**Blennius punctifer* Regan.

Punctate Blenny.

1908. Regan, Ann. Nat. Mus., vol. i, pt. 3, p. 254, pl. xlii.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 141.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 414.

Depth $3\frac{2}{3}$–4, length of head $4\frac{1}{5}$–$4\frac{2}{5}$, in length of body. Eye $3\frac{1}{2}$–4 in length of head, twice the interorbital width. Profile of head nearly vertical in front. A short fringed nasal tentacle, and a similar supra-

orbital tentacle. Occiput with a median series of simple filaments. Very small canines in lower jaw. D XII 14–15, commencing above hind edge of preopercle, very slightly notched. A 17–19.

Length.—Up to 100 mm.

Colour.—Back with 6 more or less distinct dark cross-bars, numerous very small dark dots on head and body, fins dotted, a dark spot or ocellus between 1st and 2nd dorsal spines.

Locality.—Coast of Natal and Zululand.

Type in British Museum.

Regan differentiates this species from *cristatus* C. and V. on slender and inconstant features. It seems also very closely allied to *steindachneri* Day, or *semifasciatus* Rüpp. (*cf.* Day, Fish. India, p. 326). It seems impossible to separate *punctifer* from *cristatus* for purposes of the key on p. 832.

**Blennius cristatus* Linn.

Crested Blenny.

1758. Linné, Syst. Nat., ed. 10, vol. i, p. 256.

1898. Jordan and Evermann, Fish. N. and Mid. Amer., vol. iii, p. 2382.

1876–81. Günther, Fische d. Südsee, vol. ii, p. 194, pl. cxiii, fig. E.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 145 (references).

Depth nearly equal to length of head, which is 4–5 in length of body. Eye $3\frac{3}{4}$–$4\frac{1}{4}$ in length of head, $1\frac{1}{2}$ times the interorbital width. Profile of head very abruptly descending. Nasal tentacle short, fringed; supraorbital tentacle short, not exceeding diameter of eye in length, fringed. Occiput and nape with a crest of 10–20 filaments. Canines small, often absent in upper jaw. D XI–XII 14–16, commencing above hind end of preopercle, very slightly notched. A II 16–18. Lateral line anteriorly a double row of pores. Gill-membranes forming a fold across throat.

Length.—Up to 100 mm.

Colour.—Brownish or olivaceous, 5–6 dark cross-bars on body extending on to base of dorsal fin, on which is also a black spot between 1st and 2nd spines, caudal with dark cross-bar, pectorals spotted, anal with dark margin.

Locality.—Cape seas.

Distribution.—Warm parts of the Atlantic, east and west sides, Island of Ascension, Tonga Islands (Pacific).

Günther identified a specimen from Cape seas with this species, but Gilchrist and Thompson apparently never saw one.

The wide distribution is considered by Günther to be due to the fish living on floating weed and other objects.

Blennius scullyi G. and T.

Scully's Blenny.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 103.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 145.

Depth about equal to length of head, $3\frac{3}{4}$ in length of body. Eye $1\frac{1}{2}$ in snout, $4\frac{3}{4}$ in length of head, $1\frac{1}{2}$ times the interorbital width. Profile of head abruptly descending. A deep groove behind orbits. Nasal tentacle fringed in Natal specimens; supraorbital tentacle $1\frac{1}{3}$ times diameter of eye, tapering, with shorter filaments at its base. Canines in upper jaw smaller than those in lower jaw. D XII 19, commencing above hind end of preopercle, slightly notched. A II 21. Lateral line anteriorly a double row of pores. Gill-membranes forming a fold across throat.

Length.—Up to 90 mm.

Colour.—Brownish, mottled with darker; Natal specimens are rather definitely spotted; a dark spot between 1st and 2nd dorsal spines.

Locality.—Walfish Bay and Natal coast.

Type in South African Museum.

The presence of this species on the Natal coast is interesting; no specimens have yet been found around the Cape Peninsula or any intermediate locality.

Blennius ocellatus G. and T.

Ocellate Blenny.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 103.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 145.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 35.

Depth about equal to length of head, $3\frac{4}{5}$–$4\frac{1}{5}$ in length of body. Eye equal to snout, $3\frac{1}{2}$ in length of head, $2\frac{1}{2}$ times interorbital width. Profile of head very abruptly descending, almost vertical. No groove behind orbits. A very short, simple, nasal tentacle; a cluster of tentacles over each eye, the longest being about $1\frac{1}{2}$ times diameter

of eye, sometimes bifid. No canines. D XII 21, commencing a little behind hind margin of preopercle, very slightly notched. A II 21. Lateral line anteriorly a double row of pores. Gill-membranes forming a fold across throat.

Length.—Up to 80 mm.

Colour.—Light brownish, mottled, the mottling forming 6–7 irregular cross-bands extending to base of dorsal fin, the 1st band behind the pectorals being continued as a dark spot on the dorsal between the 3rd–5th spines ; anal fin with light margin.

Locality.—Saldanha Bay, False Bay, 9–14 fathoms.

Type in South African Museum.

**Blennius hypenetes* Klunz.

Moustache Blenny.

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, p. 492.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

Depth 7½, length of head 6, in length (total length). Eye 3½ in length of head. Profile of head vertical. A long nasal tentacle hanging down over mouth. No orbital tentacle. Occipital crest present in adult (? ♂ only). No canines. D XII 19, deeply notched. A 21–23.

Length.—Up to 60 mm.

Colour.—Greyish, with 7–8 brown cross-bars, front half of body with scattered black dots, hind half with 2–3 longitudinal light blue stripes, occipital crest, nasal tentacle and a spot on throat yellow, dorsal mottled or spotted, several white lines on soft portion, anal yellow with black border, caudal with black margin.

Locality.—Natal coast.

Distribution.—Red Sea.

This little Blenny is easily distinguished by the moustache-like nasal tentacle which hangs down over the mouth.

B. variopunctatus Jatz. and Lenz. (1898, Abh. Senckenb. Ges., vol. xxi, p. 511, pl. xxxv, fig. 8) from Zanzibar appears to be the same species, although the authors give the dorsal formula as D XIV 18, and state that there is one canine in the lower jaw.

Blennius capito C. and V.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 260.

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 215.

? 1861. Castelnau, Mem. Poiss. l'Afr. Austr., p. 50 (*castaneus*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 144.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322 (name only).

Depth about equal to length of head, $4\frac{1}{4}$–$4\frac{3}{4}$ in length of body. Eye $1\frac{1}{2}$ in snout, $4\frac{1}{2}$ in length of head, nearly twice the interorbital width. Snout very blunt, profile of head abruptly descending. Interorbital space concave. A deep transverse groove behind orbits. A short fringed nasal tentacle; a bushy fringed tentacle above the orbit; 34–38 teeth in each jaw; no canines. D XIII 19–21, commencing just in front of hind margin of operculum, very slightly notched. A I 21–22. Lateral line anteriorly a double row of pores, with the transverse connections usually very well marked. Gill-membranes united to isthmus, not forming a fold across the throat. Skin loose and spongy, enveloping the dorsal and anal fins.

Length.—Up to 200 mm.

Colour.—Light brown, marbled with dark blackish brown; belly lighter; dorsal, pectoral, and caudal dark brown with more or less distinct light edging, one or two light cross-bars on base of caudal; anal dark with light edging.

Locality.—Hout Bay, Cape Peninsula, Natal.

This species has only once been observed since it was described by Cuvier and Valenciennes. Gilchrist and Thompson (1908, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 102) merely quote the original description. There are two specimens in the South African Museum.

It is the largest of the South African Blennies, and easily distinguished by the absence of the fold across the throat, as well as by the loose flabby skin. The lateral line is not distinctive, being of the same structure as in *cornutus* and other species. Similarly the character of the lateral line, relied upon by Castelnau to distinguish his species *castaneus* from *capito*, is merely that found in all the other South African Blennies (except *bifilum*).

B. castaneus Cast. has been tentatively made synonymous with *capito*, though the coloration corresponds more closely with that of *cornutus*.

Gen. Petroscirtes Rüpp.

1828. Rüppell, Atl. Fische, p. 110.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 279 (*Blennechis*).

Body elongate, compressed. Snout usually short, blunt or subconical. Cleft of mouth small, horizontal, inferior. A strong curved canine in both jaws, that of the lower jaw much larger than that of

upper jaw, behind the single series of immovably fixed teeth. Gill-opening reduced to a small aperture above the root of the pectoral. Gill-membranes not forming a fold across throat (sometimes a very slight fold). Dorsal fin entire, not notched between spinous and soft portions, the anterior spines usually elevated. Orbital tentacles usually developed. No pyloric caeca. Lateral line incomplete, consisting of a few tubules running along base of anterior part of dorsal fin. Pseudobranchiae present.

These little Blennies are inhabitants of tide-pools on rocky coasts or coral reefs in the Indo-Pacific region.

Key to the South African species.

1. No tentacles.
   - *a.* An occipital crest . . . . . *woodi.*
   - *b.* No occipital crest.
     - i. D 44–45, A 32 . . . . . *rhinorhynchus.*
     - ii. D 32, A 24 . . . . . *elongatus.*
2. A very small simple supraorbital tentacle, and a pair on chin . *variabilis.*
3. Several fringed tentacles on head and chin . . . . . *mitratus.*

Petroscirtes woodi (G. and T.).

Wood's Blenny.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 105.
1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.
1918. Thompson, Mar. Biol. Rep., vol. iv, p. 146.

Depth $5\frac{2}{3}$–6, length of head 5–$5\frac{1}{3}$, in length of body. Eye $1\frac{1}{2}$ in snout, $4\frac{3}{4}$–5 in length of head, $1\frac{1}{3}$ times interorbital width. Snout blunt, profile abruptly descending, upper lip overhanging mouth. Canine in lower jaw large, slightly curved, that in upper jaw smaller but more strongly curved. No tentacles. A fleshy crest extending along the interorbital space and occiput, half the length of head in height (when fully developed). D 30–32, commencing above the gill-opening, anterior rays not elevated, rays increasing in length from 1st to about the 28th. A 21–23. V 2, about $\frac{2}{3}$ length of head. Caudal rounded.

Length.—Up to 93 mm.

Colour.—Pale brown, with 10–12 dark brown or black cross-bars, snout with a median dark band, sides of head with 3–4 somewhat irregular vertical bars, which are continued across the throat, an oval black spot above the gill-opening; fins translucent or dusky,

sometimes with dark spots at bases of dorsal and anal corresponding with the body bands.

Locality.—Port Elizabeth, East London, Durban, Delagoa Bay.

Type in South African Museum.

Easily distinguished from the other species of this genus by its occipital crest, which gives it the appearance of a member of the next genus (*Salarias*). The crest is only developed when the animal reaches a length of about 35–40 mm.

Exceedingly close to, if not merely a colour variety of, *P. striatus* Jatz. and Lenz (1898, Abh. Senckenb. Ges., vol. xxi, p. 512, pl. xxxv, fig. 9) from Zanzibar.

**Petroscirtes rhinorhynchus* Blkr.

Blue-striped Blenny.

1852. Bleeker, Nat. Tijds. Ned. Ind., vol. iii, p. 273.
1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 230.
1876–81. *Id.*, Fische d. Südsee, p. 195, pl. cxv, fig. E.
1913. Weber, Siboga Exp. Monogr. 57, p. 540.
1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.

Depth 7, length of head $5\frac{1}{2}$–$5\frac{2}{3}$, in length of body. Eye equal to snout, $3\frac{3}{4}$ in length of head, equal to interorbital width. Snout conical, projecting beyond cleft of mouth. No tentacles. No canines in upper jaw. D 44–45, commencing above hind margin of preopercle, anterior rays not elevated. A 32.

Length.—Up to 75 mm.

Colour.—Brownish, with 2 bluish longitudinal stripes from snout to tail, fins yellowish, dorsal and anal edged with brown, a black patch at base of caudal fin.

Locality.—Natal coast.

Distribution.—East Indies, Pacific.

Although somewhat similar in colour pattern to *Aspidontus taeniatus*, this species is easily distinguished by the much smaller gill-openings.

**Petroscirtes elongatus* Peters.

Elongate Blenny.

1855. Peters in Wiegm. Arch., p. 249.
1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 233.
1876–81. *Id.*, Fische d. Südsee, vol. ii, p. 196.

Depth $6\frac{1}{2}$, length of head $5\frac{1}{3}$, in length of body. Profile of snout very convex, its length scarcely as great as diameter of eye, which is 3 times the interorbital width. Lower canine twice size of upper. No tentacles. D 32, commencing somewhat in advance of vertical from root of pectoral, anterior rays not elevated. A 24. Caudal emarginate.

Length.—Up to 100 mm.

Colour.—Greenish, a white-edged ocellus on opercle, dorsal and anal with white stripes, a dark spot (in ♂) between the 23rd and 25th dorsal rays.

Locality.—Mozambique.

Distribution.—East coast of Africa, East Indies, North Australia, Fiji Islands.

Petroscirtes variabilis Cant.

Sabre-toothed Blenny.

1849. Cantor, Cat. Malay. Fish., p. 200.

1855. Peters in Wiegm. Arch., p. 246 (*cynodon*).

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 234.

1878–88. Day, Fish. India, p. 327, pl. lxix, fig. 7.

1898. Jatzow and Lenz, Abh. Senck. Nat. Ges., vol. xxvi, p. 513, pl. xxxv, fig. 10.

Depth $4\frac{3}{4}$–5, length of head $3\frac{4}{5}$–4, in length of body. Eye $1\frac{1}{2}$ in snout, $4\frac{1}{2}$ in length of head, equal to interorbital width. Snout somewhat conical, truncate in front. Upper lip overhanging mouth. Canine in lower jaw very large, curved (but not hooked) like a sword; that in upper jaw much smaller, at some little distance behind the other teeth. A very small simple tentacle at the upper posterior margin of eye, and a pair of similar tentacles on the chin. D 28–31, commencing above hind margin of preopercle, anterior rays not elevated, or only in adult males. A 17–21. V 3, middle ray longest, about $\frac{1}{2}$ length of head. Caudal subtruncate, the upper and lower rays sometimes elongated.

Length.—Up to 110 mm.

Colour.—Pinkish, more or less marbled, a bluish or blackish longitudinal stripe from eye to tail, where it forms a black patch; a blackish stripe or series of blotches along base of dorsal; dorsal and anal spotted, the spots more or less in bands; caudal yellowish, usually with transverse lines of spots.

Locality.—Mozambique.

Distribution.—East coast of Africa, Indian seas, East Indies to Australia.

**Petroscirtes mitratus* Rüpp.

1828. Rüppell, Atl. Fische, p. 111, pl. xxviii, fig. 1.
1855. Peters in Wiegm. Archiv., p. 248 (*barbatus*).
1861. Günther, Cat. Fish. Brit. Mus., vol. iii, pp. 237, 238.
1866. Kner, SB. Ak. Wiss. Wien, vol. liv, fig. 5 (*longifilis*).
1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 496.
1876–88. Günther, Fische d. Südsee, vol. ii, p. 198.

Depth equal to length of head, about 4 in length of body. Eye equal to length of snout, and about equal to interorbital width, 4 in length of head. A fringed tentacle over eye, and similar ones on sides of head and on chin. Upper canine smaller than lower. D 25–27, commencing a little behind vertical from hind margin of eye, anterior rays elevated. A 16–18. V 3, middle ray longest, reaching to vent. Caudal subtruncate.

Length.—Up to 70 mm.

Colour.—Yellowish or greenish, marbled with brown or reddish, 2–3 black-edged ocelli on back ; dorsal, anal, and caudal banded and spotted with brown.

Locality.—Mozambique.

Distribution.—East coast of Africa, Red Sea, Mauritius, Samoa Islands.

P. hypselopterus Blkr. (=*mitratus* Blkr. non Rüppell) is very closely allied, but differs in having a shorter snout with the profile more abruptly descending.

Gen. Aspidontus Q. and G.

1834. Quoy and Gaimard, Voy. Astrol., Poiss., p. 719.

This genus resembles *Petroscirtes*, but the gill-opening is larger, extending down in front of root of pectoral.

The character of the anterior dorsal rays, whether elevated or not, cannot be used, as it appears to be a sexual character. The elevated crest seems to be developed only in adult males, though this requires investigation.

Aspidontus taeniatus Q. and G.

Striped Blenny.

1834. Quoy and Gaimard, Voy. Astrol., Poiss., p. 719, pl. xix, fig. 4.
1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 280, pl. cccxxvi (*filamentosus*).

1857. Bleeker, Act. Soc. Sc. Indo-Nederl., vol. ii, p. 62 (*rostratus* Solander MSS.).

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 231.

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 495 (*filamentosus*).

1876–81. Günther, Fische d. Südsee, vol. ii, pp. 195, 196, pl. xiv, figs. A, B.

1903. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lv, p. 170, pl. vii (*tractus*).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 105 (*filamentosus*).

1913. Weber, Siboga Exp. Monogr. 57, p. 544 (references).

Depth $5\frac{1}{2}$–$8\frac{1}{2}$, length of head 4–$4\frac{1}{2}$, in length of body. Eye $1\frac{1}{3}$–$1\frac{1}{2}$ in snout, 3–$4\frac{1}{2}$ in length of head, slightly less than interorbital width. Snout pointed, upper profile of head straight. Cleft of mouth scarcely reaching anterior margin of eye. A very short, simple nasal tentacle, but otherwise no tentacles. Upper surface of head reticulate. Fourteen to eighteen teeth in each jaw; lower canines very strong, falcate, curved backwards. Gill-opening equal to length of snout. D 36–39, commencing on a line midway between hind margins of eye and preopercle, first 3–4 rays elongate, filamentous, as long as head. A 26–28. V 3, outer 2 rays reaching nearly to vent, innermost ray short.

Length.—Up to 125 mm.

Colour.—Blue or brownish or greenish, a black or dark longitudinal stripe from snout through eye to tail, body silvery below this stripe; elevated part of dorsal dark, several other dark patches on dorsal, or whole dorsal dark with light margin, anal dark with light margin, caudal dark with upper and lower margins transparent or yellowish.

Locality.—Natal and Zululand coast.

Distribution.—East coast of Africa, New Guinea, East Indies, Pacific.

In the colour pattern there is an exact likeness between this species and *Labroides dimidiatus* of the Wrasse family, which has already been mentioned (p. 750) under the latter species. As in that species, two varieties are found, one with the streak across the base of the pectoral (*tractus*), and one without (*taeniatus*).

There is also some resemblance in the general scheme of coloration to that of *Petroscirtes rhinorhynchus* (p. 840).

Gen. Salarias Cuv.

1829. Cuvier, Règne Anim., ed. 2, p. 175.

1898. Jordan and Evermann, Fish. N. and Mid. Amer., vol. iii, p. 2396 (*Scartichthys*, *Rupiscartes*, *Entomacrodus*, *Salariichthys*).

Body elongate, compressed. Snout very blunt, the profile vertical or nearly so. Cleft of mouth moderate, upper jaw overlapping lower. Canine teeth present or absent. Both jaws with a single comb-like series of fine teeth, which are inserted in the gums and movable. Vomerine teeth sometimes present (*Salariichthys*). Gill-openings large, continuous across throat. Gill-membranes free from isthmus. Dorsal fin either continuous or feebly notched, or with a distinct notch between anterior (spinous) and posterior (soft) portions. Caudal rounded, free, but last ray of dorsal sometimes (? in breeding males) connected by membrane with the caudal. Orbital tentacles usually present. A fleshy occipital crest frequently developed, either in both sexes or males only. Lateral line a series of tubules, becoming obsolete posteriorly. Pseudobranchiae present. Air-bladder and pyloric caeca absent.

A large genus of small herbivorous fishes dwelling in rock-pools and coral reefs in tropical and subtropical regions. The genus has been subdivided according to the presence or absence of a notch in the dorsal fin, canines, etc., but is here adopted in the wide sense. The occipital crest is always absent in juveniles, and may not be developed at all in some species. In other species it seems to be present in both sexes, and in others in males only.

They jump about in the pools and among the rocks with great rapidity, for which reason they are called Skipping Blennies.

Key to the South African species.

I. No canine teeth.
- A. No orbital tentacles . . . . . *sexfasciatus.*
- B. Orbital tentacle simple . . . . . *rivulatus.*
- C. Orbital tentacle fringed.
  - 1. With cross-bands. 20–22 soft dorsal rays.
    - *a.* Lips not crenulate . . . . . *dussumieri.*
    - *b.* Lips crenulate . . . . . *meleagris.*
  - 2. Without cross-bands. 17 soft dorsal rays . . . *unicolor.*

II. Canine teeth present.
- A. A transverse row of filaments across the nape . . . *kosiensis.*
- B. No filaments on nape.
  - 1. Orbital tentacle simple . . . . . *periophthalmus.*
  - 2. Orbital tentacle fringed . . . . . *oortii.*

**Salarias sexfasciatus* von B.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 34, pl. iii, fig. 1.

Depth $5\frac{7}{10}$, length of head $5\frac{1}{10}$, in length of body (the figure shows depth about equal to length of head, just under 5 in length of body). Eye 5 in length of head (in figure 4 times at the most). Profile vertical. No canines. Nasal tentacle neither described nor figured. Supraorbital tentacles absent. A pair of long simple tentacles on nape, about $\frac{4}{5}$ length of head. No occipital crest. D XI 20, notched, last ray joined to caudal. A 21.

Length.—Up to 79 mm.

Colour.—Yellowish, with 6 dark cross-bars extending on to dorsal fin, sides with scattered yellow, black-edged round or oval spots ; soft dorsal with whitish spots, caudal with whitish cross-bands.

Locality.—Natal coast.

Type in coll. Govt. Marine Survey.

This species is remarkable for the absence of the orbital, and apparently also the nasal, tentacles. But for this feature, these specimens do not seem different from *rivulatus.*

Salarias rivulatus Rüpp.

Banded Skipping Blenny.

1828. Rüppell, Atl. Fische, p. 114.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 329 (*quadricornis*).

1878–88. Day, Fish. India, p. 331, pl. xx, fig. 4 (*quadricornis*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 415 (references) (*rivulatus* and *quadricornis*).

Depth 5–$6\frac{1}{2}$, length of head $4\frac{3}{4}$–$5\frac{3}{4}$, in length of body. Eye $3\frac{1}{2}$–4 in length of head, slightly longer than snout, about twice interorbital width. Profile vertical. No canines. Nasal tentacle short, fringed ; the supraorbital tentacles and the pair on the nape simple. Occipital crest present in ♂. D XII–XIII 20–22, notched, last ray joined to caudal in adult. A 22–24.

Length.—Up to 150 mm.

Colour.—Very variable ; yellowish, greenish, or brownish, with about 8 dark cross-bands in pairs, often wavy, yellow, ocellate longitudinal spots or lines, dorsal with oblique lines of dark spots, anal with bluish streaks, tips of anal rays white.

Locality.—Coast of Natal and Zululand.

Distribution.—East coast of Africa, Madagascar, Indian seas, East Indies, S. Pacific.

Salarias dussumieri C. and V.

Dussumier's Skipping Blenny.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 310.

1878–88. Day, Fish. India, p. 333, pl. lxx, fig. 7.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 108 (*barbatus*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 415 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 146 (references).

Depth equal to length of head, 5–5½ in length of body. Eye about equal to snout, 3¾–4½ in length of head, twice interorbital width. Profile vertical. No canines. Nasal and supraorbital tentacles fringed. Occipital crest in ♂. D XII–XIII 20–22, notched, last ray joined to caudal. A 24–26, first 2 rays very small.

Length.—Up to 120 mm.

Colour.—Greenish or brownish, with irregular and often discontinuous cross-bars or stripes, sometimes in pairs; dorsal, caudal, and anal with rows of dark spots, usually a dark spot between 1st and 2nd dorsal spines, anal with dark edge.

Locality.—Natal coast, Delagoa Bay.

Distribution.—East coast of Africa, Indian seas.

Type of *barbatus* in S. African Museum.

S. barbatus is founded on ♀ specimens in which the upper and lower lips have a number of hair-like cirri, but otherwise resembling *dussumieri*. The feature is not constant, and I am unable to separate them from other female specimens which certainly belong to *dussumieri*.

**Salarias meleagris* C. and V.

Spotted Skipping Blenny.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 332.

1876–88. Günther, Fische d. Südsee, vol. ii, p. 208, pl. cxvi, fig. D.

1913. Weber, Siboga Exp. Monogr. 57, p. 535 (references).

1918. Regan, Ann. Durban Mus., vol. ii, pt. 2, p. 77.

Depth 5½–6½, length of head 5–5½, in length of body. Profile vertical. No canines. Nasal and supraorbital tentacles fringed; a pair of simple tentacles on the nape as frequently absent as present. Occipital crest in ♂. Lips crenulate. D XII 20, notched. A 22.

Length.—Up to 150 mm.

Colour.—Brownish, with indistinct cross-bands and round white spots, dorsal fin with oblique stripes, anal dark, with white spots.

Locality.—Natal coast.

Distribution.—Zanzibar, East Indies, Tasmania.

This species seems very closely allied to *dussumieri*. I do not know whether the crenulate character of the lips is really distinctive. It seems not improbable that the specimens identified by Gilchrist and Thompson, and myself, as *dussumieri*, and those identified by Regan as *meleagris*, belong in reality to one and the same species.

**Salarias unicolor* Rüpp.

1835. Rüppell, Neue Wirbelt. Fische, p. 136.

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 259.

1878–88. Day, Fish. India, p. 334, pl. lxx, figs. 5, 6.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 35.

Depth equal to length of head, 5–5½ in length of body. Eye 1½–2 in snout, twice interorbital width. Profile slightly oblique. Nasal and supraorbital tentacles fringed. Occipital crest in ♂. No canines. D XII 17–18, notched. A 18–19.

Length.—Up to 120 mm.

Colour.—Brownish, without cross-bands, but blotched and marbled; rows of blue spots on head and body, fins yellowish, dorsal obliquely striped, caudal banded.

Locality.—Natal coast, Mozambique.

Distribution.—East coast of Africa, Red Sea, Indian seas.

Salarias kosiensis Regan.

Collared Skipping Blenny.

1908. Regan, Ann. Nat. Mus., vol. i, pt. 3, p. 254, pl. xlii, fig. 3.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 107.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 415.

Depth about equal to length of head, 3⅕–3⅔ in length of body. Eye 1½–1¾ in snout, 5 in length of head, about equal to interorbital width. Profile slightly oblique. Canines in lower jaw. Nasal tentacle fringed; supraorbital tentacle simple, tapering, reaching to commencement of dorsal in ♂, shorter in ♀. A transverse row of fine hair-like filaments across nape, behind which is a transverse groove. D XI–XII 11–12, notched, last ray not connected with caudal. A II 13–14, 1st two spines covered with spongy corrugated skin in ♂, very short in ♀.

Length.—Up to 190 mm.

Colour.—Dark bluish grey, brownish, or yellowish, with faint cross-bands (3–4) and mottlings, head and shoulders with small dark dots, dorsal fin obscurely marbled, tips of anal rays light.

Locality.—Coast of Natal and Zululand.

Type in British Museum.

The fringe on the nape at once distinguishes this species from all the other S. African species of *Salarias*.

If a subdivision of the genus *Salarias* be adopted, this species would be placedin the genus *Exallias* Jord. and Everm. 1905, distinguished by its short body and fewer dorsal and anal rays.

**Salarias periophthalmus* C. and V.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 311, pl. cccxxviii.

1876–81. Günther, Fische d. Südsee, vol. ii, p. 207, pl. cxiv, figs. D, E.

1878–88. Day, Fish. India, p. 333, pl. lxix, fig. 5.

1913. Weber, Siboga Exp. Monogr. 57, p. 532.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

Depth about equal to length of head, 5 in length of body. Eye equal to snout, 3–3½ in length of head, twice interorbital width. Profile vertical or the forehead projecting over the upper lip; eyes very prominent. Canines in lower jaw. Nasal tentacle fringed, supra-orbital tentacle simple. Occipital crest in ♂. D XII 20–21, notched, last ray not, or scarcely, connected with caudal. A 21–22.

Length.—Up to 150 mm.

Colour.—Rosy, with irregular brown cross-bands, bluish spots and streaks on head, two rows of bluish or pearly spots along the sides, dorsal with dark oblique stripes, caudal yellowish, anal orange with dark margin.

Locality.—Natal coast.

Distribution.—East coast of Africa, Indian seas, East Indies, Southern Pacific.

The prominent eyes and the two rows of pearly spots are characteristic of this species.

**Salarias oortii* Blkr.

1851. Bleeker, Nat. Tijdsskr. Nederl. Ind., vol. i, p. 257, fig. 15.

1861. Günther, Cat. Fish. Brit. Mus., vol. iii, p. 257.

1866. Playfair (and Günther), Fish. Zanz., p. 77.

1891. Sauvage, Hist. Nat. Poiss. Madagasc., p. 522.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 35.

Depth 6–7½, length of head 6–7, in " total length " (Günther). Profile not quite vertical, forehead not projecting beyond mouth. Small canines in lower jaw. Nasal and supraorbital tentacles both fringed. Occipital crest rounded. D XII 19–21, deeply notched, last ray continuous with caudal. A 23–24.

Length.—150 mm.

Colour.—Rosy, with paired violet cross-bands, spinous dorsal violet with whitish stripes, soft dorsal violet with bluish oblique stripes and reticulations, anal rose at base, violet along margin, caudal yellow, with brown margins reticulated with blue.

Locality.—Natal coast.

Distribution.—E. Indies, east coast of Africa.

Gen. Xiphasia Swains.

1839. Swainson, Nat. Hist. Fishes, etc., vol. ii, p. 259.

1858. Kaup, Proc. Zool. Soc., p. 168 (*Nemophis*).

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 374 (*Xiphogadus*).

Body eel-shaped, posteriorly compressed. Snout subconical. Mouth small, terminal. Teeth in both jaws, subconical, close together, more curved in lower than upper jaw, a pair of canines in lower jaw; palate toothless. Gill-opening small, before the root of pectoral fin. Dorsal and anal fins entire, composed of flexible rays, confluent with caudal. Ventral of three rays, below the gill-opening.

Three or four species of these curious pelagic Blennies have been described from the Indo-Pacific region. None of them, however, are well known, and possibly only one or two species will be recognised later.

**Xiphasia setifer* Swains.

1839. Swainson, *loc. cit.*, vol. ii, p. 259.

1878–88. Day, Fish. India, p. 337, pl. lxxiii, fig. 1.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 263.

Dorsal beginning in advance of the eye. Middle caudal ray produced as a hair-like filament. According to Day's figure the body has dark patches or cross-bands along the body.

Length.—Up to 400 mm.

Colour.—Mauve brown, with paler bands; fins with darker margins.

Locality.—Natal coast.

Distribution.—Indian Ocean.

Fam. 2. Clinidae.

Body elongate, usually with small scales more or less embedded in the skin. Mouth protractile. Teeth conical or villiform in both jaws, and often on vomer and palatine. Spinous portion of the dorsal longer than soft portion. Anal with 1–2 spines. Caudal free. Ventrals jugular, with 1 spine and 2–4 simple rays, 2–3 of which are usually thickened and free distally. Gill-membranes united, free from isthmus. Pseudobranchiae present.

A family of mostly small-sized fishes from temperate and tropical coasts and shallow water. They are carnivorous, and generally viviparous.

Key to the South African genera.

1. Dorsal fin undivided.
   - *a.* Lateral line a single row of tubules . . . . . *Clinus.*
   - *b.* Lateral line a double row of pores . . . . *Clinoporus.*
2. Dorsal fin divided into two, the anterior crest being separate from rest of fin *Petraites.*
3. Three separate dorsal fins.
   - *a.* Head scaly . . . . . *Gillias.*
   - *b.* Head scaleless.
     - i. Lateral line following curve of back, with a secondary series of incised scales posteriorly . . . . . *Enneapterygius.*
     - ii. Lateral line curving down from shoulder, no incised scales *Helcogramma.*

Gen. Clinus Cuv.

1817. Cuvier, Régne Anim.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 352.

Scales small or minute, more or less embedded in the skin, cycloid. A single continuous dorsal fin, the first 3 (4 or 5) spines often forming a more or less elevated crest. Lateral line a single series of tubules, the anterior ones often on enlarged scales. Inner margin of shoulder-girdle (under the edge of opercle) with an upturned hook-like projection.

A large genus. Some of the species are very abundant and of excellent flavour.

Gilchrist and Thompson have monographed the South African species in Ann. S. Afr. Mus., vol. vi, pt. 2, p. 110, 1908; and in a more popular form, with an account of their habits, in the South African Journal of Science, vol. vii, p. 214, 1911.

Various attempts have been made to split up the genus. Gilchrist and Thompson retained the name *Clinus sensu lato*, but suggested

a new genus, *Clinoides* (*loc. cit.*, p. 98), to include the non-crested species. *Clinoides* thus embraces *Clinus* of Swainson and of Gill, *Blennophis* Swains., *Cirribarbis* C. and V., and *Blennioclinus* Gill. So far as the South African fauna is concerned it seems sufficient to group all the species under *Clinus*. I have, however, separated off *biporosus* under a new genus on account of the very distinctive character of the lateral line.

The males in this genus are easily distinguished by the intromittent organ, an account of which, with references to earlier literature, is given by Rauther in Schultze, Forsch. Reise Centr. u. S. Afrika, vol. iii, p. 467, 1909.

The genus is characteristic of the colder waters of the Cape, South America, and Australia, though also extending into the Northern Hemisphere. In South Africa it is especially abundant around the Cape Peninsula, its place being taken further eastwards by the very closely allied genus *Petraites*.

Key to the South African species.

I. Dorsal deeply notched between the spinous and soft portions (*Blennioclinus*) *brachycephalus.*

II. Dorsal not notched between spinous and soft portions.

A. Snout and chin with barbels (*Cirribarbis*) . . . . *capensis.*

B. No barbels.

1. Body strongly compressed. No vomerine teeth (*Myxodes*).

a. Teeth in a single row. No notch between crest and succeeding dorsal spines . . . . . *fucorum.*

b. Two rows of teeth. A notch between crest and succeeding dorsal spines . . . . . *mus.*

2. Body not strongly compressed.

a. With dorsal crest.

i. With orbital tentacles.

α. Dorsal commencing above hind margin of preopercle.

* Dorsal spines without cirri. Two ventral rays *superciliosus.*

** Dorsal spines with cirri. Three ventral rays *brevicristatus.*

β. Dorsal commencing above hind margin of eye *ornatus.*

ii. Without orbital tentacles . . . . . *pavo.*

b. No dorsal crest.

i. With orbital tentacles (*Ophthalmolophus*).

α. Dorsal spines 30–35.

* Soft dorsal rays 7 or fewer. Anal 21–24.

† A marked occipital groove.

§ Dorsal notched between 3rd and 4th spines . . *taurus.*
§§ Dorsal not notched . *cottoides.*
†† No occipital groove . *acuminatus.*
** Soft dorsal rays 9 or more. Anal 26–28.
† Third ventral ray minute . *latipennis.*
†† Third ventral ray well developed *robustus.*
β. Dorsal spines 39–49.
* Anal 24–28.
† Two to three soft dorsal rays *venustris.*
†† One soft dorsal ray . . *dorsalis.*
** Anal 31–36.
† All 3 rays of ventral strong . *anguillaris.*
†† Third ray minute . . *striatus.*
ii. No orbital tentacles . . . . . *heterodon.*

Clinus brachycephalus C. and V.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 371.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 135.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 147.

Depth $4\frac{1}{2}$–5, length of head 4–$4\frac{1}{2}$, in length of body. Eye $1\frac{1}{2}$ times snout, twice interorbital width, $3\frac{1}{2}$–$4\frac{1}{2}$ in length of head. Profile convex, snout rather blunt. No tentacle over eye. Maxilla reaching to vertical from anterior margin or anterior third of eye. A band of small teeth behind the outer row, a curved band on vomer. D XXIX 9–10, commencing above hind margin of preopercle, no crest, 4th spine shorter than the first 3, a deep notch between spinous and soft portions of fin, soft rays longer than the spines. A II 23–24. P 13. V I 3, 3rd ray united to 2nd. Caudal rounded. Skin transversely rugulose, scales not imbricate.

Length.—Up to 115 mm.

Colour.—Variable; mottled reddish, greenish, or brownish, sometimes with a broad white band from opercle to posterior third of body, with white (or bluish) spots above and below; pectorals, ventrals, and anal with brilliant red patches; an ocellate spot above the axil.

Locality.—False Bay.

The deep notch between the spinous and soft portions of the dorsal fin is the characteristic feature of this species.

Clinus capensis (C. and V.).

Bearded Klip-fish.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 406, pl. cccxxxvii (*Cirribarbis c.*).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 131.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 147.

Depth $5\frac{1}{3}$–$5\frac{1}{2}$, length of head $3\frac{2}{3}$–$4\frac{1}{5}$, in length of body. Eye 2 in snout, $1\frac{1}{2}$ times interorbital width, $6\frac{1}{2}$ in length of head. Profile straight or slightly concave, snout long and pointed, with 3 apical barbels; lower jaw projecting beyond upper, 8 barbels on chin. A fringed tentacle over eye. Maxilla reaching to or slightly beyond vertical from anterior margin of eye. Teeth villiform, the outer row not strongly enlarged, a curved band on vomer. D XL–XLIII 6–8, commencing above hind margin of preopercle, no crest, spines gradually increasing in length, soft rays slightly higher than preceding spines, each spine with a cluster of little cirri at apex. A II 28–33. P 13–14. V I 3, 3rd ray minute. Caudal subtruncate. Cheeks and opercles scaly.

Length.—Up to 250 mm.

Colour.—Mottled brown, greenish, or yellowish, often with a row of dark blotches below dorsal fin and irregular transverse bars on body, usually an ocellate spot above axil.

Locality.—False Bay.

This species is easily distinguished by the barbels on the snout and chin. With the exception of *anguillaris* and *striatus*, it is the only South African species with scaly cheeks.

Clinus fucorum G. and T.

Weed Klip-fish.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 121.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 148.

Body deep and strongly compressed. Depth $3\frac{1}{3}$–4, length of head 4–$4\frac{1}{3}$, in length of body. Eye subequal to snout and to interorbital width, $5\frac{1}{3}$–$5\frac{1}{2}$ in length of head. Profile abruptly descending, snout short, blunt, apically tilted up. Lower jaw projecting beyond upper, cleft of mouth oblique, maxilla reaching to vertical from anterior

margin of eye. No tentacle over eye. A single row of teeth in each jaw ; no vomerine teeth (original description erroneous in this respect). D XXVIII–XXX 5–6, commencing above a point midway between eye and hind margin of preopercle, more or less undulating, first 4–5 more elevated than the rest, forming a rounded crest, first 2 soft rays higher than preceding spines (except in young). A II 19–21. P 12. V I 3, 3rd ray well developed. Caudal rounded. Caudal peduncle comparatively slender.

Length.—Up to 235 mm.

Colour.—Uniform brown, yellow, or greenish ; fins and body often speckled, the speckling on the body forming about 6 indefinite cross-bars ; a circular silvery-white patch behind the pectoral fins (which can be concealed by the fin), more marked in ♂ than ♀ ; the membrane of the dorsal, anal, and caudal fins in places transparent ; margins of dorsal and anal frequently orange.

Locality.—False Bay.

Type in South African Museum.

A sluggish species living amongst fronds of seaweed, with which its coloration harmonises.

Clinus mus G. and T.

Mouse Klip-fish.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 119.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 148.

Body deep and strongly compressed. Depth $3\frac{1}{4}$–$3\frac{1}{2}$, length of head $4\frac{1}{3}$–$4\frac{1}{2}$, in length of body. Eye twice snout, twice interorbital width, $4\frac{1}{4}$–$4\frac{1}{2}$ in length of head. Profile nearly straight, snout rather pointed. Lower jaw slightly projecting beyond upper, cleft of mouth oblique, maxilla reaching to vertical from anterior margin of eye. No tentacle over eye. A single row of smaller teeth behind the front row in both jaws ; no vomerine teeth (original description erroneous in this respect). D III . XXIII–XXIV 3–4, commencing above hind margin of preopercle, more or less undulating, first 3 spines forming a crest about $\frac{1}{2}$ length of head in height, separated from the succeeding spines by a deep notch, membrane between each group of 2–3 spines transparent, soft rays shorter than preceding spines. A II 15–17. P 10–11. V I 3, 3rd ray well developed. Caudal rounded. Caudal peduncle slender, twice as long as deep.

Length.—Up to 100 mm.

Colour.—Variable; usually uniform greenish, brownish, crimson, or yellow, sometimes with dark blotches along base of dorsal fin.

Locality.—False Bay.

Type in South African Museum.

Clinus superciliosus (Linn.).

Klip-fish ; Klipvis.

1735. Linné, Syst. Nat., vol. i, p. 442.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 360, pl. cccxxxi.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 149 (references and synonymy).

Depth 3–4⅔, length of head 3–4⅕, in length of body. Eye about 1½ in snout, about equal to interorbital width, 4–6 in length of head. Profile of head convex, snout rather pointed. A fringed tentacle, with flattened stalk, over the eye. Maxilla reaching to vertical of middle or hind margin of eye. An outer row of strong teeth in both jaws, with smaller ones behind ; a curved band on vomer. D III. XXX–XXXVIII 5–9, commences above hind margin of preopercle, first 3 spines forming an elevated crest, ⅗–⅘ length of head in ♂, ⅓–½ in ♀, 4th spine shortest, anterior soft rays a little higher than adjacent spines. A II 25–30. P 15–16. V I 2. Caudal subtruncate.

Length.—Up to 275 mm.

Colour.—Variable, often (especially in breeding males) very brilliant. Reddish, yellowish, greenish, or brownish, with darker spots and mottlings, head with reticulate markings, about 6 irregular dark cross-bands extending on to dorsal fin, sometimes nearly uniform, or with irregular longitudinal bands ; supraorbital tentacle usually dark blackish-brown or liver colour.

Locality.—Walfish Bay, Saldanha Bay, Table Bay, False Bay to East London, down to 20 fathoms.

var. *arborescens* G. and T.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 115.

This form occurs with the typical form around the Cape Peninsula. It differs in having a lower dorsal crest, of the same height in both sexes, the supraorbital tentacle light in colour, with a rounded instead of a flattened stalk, and reticulate markings on the head.

Type in South African Museum.

Clinus ornatus G. and T.

Ornate Klip-fish.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 116.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 148.

Depth $3\frac{3}{4}$–$4\frac{2}{3}$, length of head $3\frac{2}{3}$–$3\frac{4}{5}$, in length of body. Eye equal to or slightly greater than snout, $1\frac{1}{3}$–$1\frac{1}{2}$ times interorbital width, $4\frac{1}{4}$–$4\frac{1}{2}$ in length of head. Profile of head rounded, snout rather blunt. A fringed tentacle over the eye. Maxilla reaching to vertical from middle or hind margin of eye. An outer row of strong teeth, with smaller ones behind; a chevron-shaped band on vomer. D III . XXX–XXXIII 6–8, commencing at vertical from hind margin of eye, first 3 spines forming an elevated crest, $\frac{1}{2}$–$\frac{4}{5}$ length of head, anterior soft rays scarcely higher than preceding spines. A II 25–28. P 15. V I 2. Caudal subtruncate.

Length.—Up to 215 mm.

Colour.—Usually vivid. Yellowish or greyish, with small dark spots and reticulations, 6 irregular dark cross-bands extending on to dorsal, pectoral and caudal usually with spots arranged in cross-bands, head with dark reticulate markings.

Locality.—False Bay, down to 13 fathoms.

Type in South African Museum.

A species closely resembling *superciliosus* in general coloration, but distinguished by the position of commencement of dorsal fin.

Clinus brevicristatus G. and T.

Low-crested Klip-fish.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 118.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 147.

Depth $4\frac{1}{5}$, length of head $3\frac{3}{4}$, in length of body (these figures were erroneously reversed in the original description). Eye $1\frac{1}{2}$ times snout, 4 in length of head, twice interorbital width. Profile of head short, snout somewhat pointed. A fringed tentacle over eye. Maxilla reaching to vertical from middle of eye. A band of small teeth behind the outer row, and a chevron-shaped band on vomer. D III . XXXI 5, commencing above hind margin of preopercle, first 3 spines forming a low crest scarcely $\frac{1}{3}$ length of head, soft rays higher than preceding spines. All the dorsal spines bear cirri at their apices; the anterior

ones each bear a group of 4–6 short cirri, the following spines 2–3 cirri, and the posterior ones 1 cirrus each. A II 23. P 13. V I 3, 3rd (innermost) ray very small. Caudal rounded. Scales comparatively large.

Length.—90 mm. (the original description excludes the tail in the measurement given).

Colour.—Seven irregular dark brown cross-bands extending on to dorsal and anal fins, the intervening spaces above the lateral line brick-red, below the lateral line whitish; pectoral, caudal, and soft dorsal semi-transparent, reticulated, and banded with darker.

Locality.—Kalk Bay in False Bay.

Type and only known specimen (♀) in S. African Museum.

A prominent feature of this species, namely, the little cirri at the apices of the dorsal spines, was not mentioned in the original description. *C. capensis* also possesses this feature and the Japanese *Azuma emmnion* J. and S. has similar cirri on the first 3 or 4 dorsal spines. Single filamentous cirri are frequently present in some of the other South African Klip-fishes.

Clinus pavo G. and T.

Peacock Klip-fish.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 123.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 149.

Body rather deep and compressed. Depth $3\frac{3}{5}$–$4\frac{1}{5}$, length of head $4\frac{1}{4}$–$4\frac{1}{2}$, in length of body. Eye slightly greater than snout, $1\frac{3}{5}$ times interorbital width, 4–$4\frac{1}{2}$ in length of head. Profile straight, elevated behind shoulder, snout pointed. Lips prominent. Cleft of mouth rather oblique, maxilla reaching to vertical from anterior margin of eye. A band of teeth behind the front row in both jaws, a curved row on vomer. No tentacle over eye. D III . XXVIII–XXXII 3, commencing above hind margin of preopercle, first 3 spines forming a crest about $\frac{2}{5}$ length of head in height, soft rays shorter than preceding spines. A II 20–22. P 12. V I 3, 3rd ray moderately developed. Caudal subtruncate.

Length.—Up to 135 mm.

Colour.—Reddish-brown, a row of dark ocellate spots at base of dorsal, irregular wavy silvery-white markings from snout to caudal along sides, sometimes with alternating dark bars above and below lateral line; pectorals, ventrals, and caudal barred with brown and white.

Locality.—False Bay.

Type in South African Museum.

Clinus taurus G. and T.

Bull Klip-fish.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 126.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 150.

Depth $3\frac{1}{2}$–4, length of head $3\frac{1}{2}$–$3\frac{4}{5}$, in length of body. Eye $1\frac{1}{3}$–$1\frac{1}{2}$ times length of snout, slightly greater than interorbital width, $4\frac{2}{3}$–$4\frac{4}{5}$ in length of head. Profile descending rapidly in front of eyes. A deep groove behind the orbits. Supraorbital ridges prominent. Snout blunt. Maxilla reaching to vertical from posterior third or hind margin of eye. A rather broad band of smaller teeth behind the front row in both jaws, and a rather broad band on vomer. A prominent fringed tentacle over eye. Mucous pores around the eye and on the interorbital, occipital, and temporal regions prominent, giving the upper part of head a granulose appearance. D XXXI–XXXV 5–6, commencing above hind margin of preopercle, no crest, a more or less deep notch between 3rd and 4th spines, 1st, 3rd, and 4th spines shortest, soft rays higher than preceding spines. A II 22–24. P 12. V I 2, a minute 3rd ray sometimes present. Caudal rounded.

Length.—Up to 210 mm.

Colour.—Variable in shade and markings; yellowish, reddish, brownish, or greenish, usually with 3–4 dark cross-bands, irregular patches of red or white on head and anterior part of body; cheeks, opercles, and throat often with dark markings, fins usually tipped with red or orange, often mottled.

Locality.—West and east coasts of the Cape Peninsula.

Type in South African Museum.

Immature specimens are often difficult to distinguish from *cottoides*, except by the notch in the dorsal fin and the considerably stronger granulosity of the head.

Clinus cottoides C. and V.

Blunt-nosed Klip-fish.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 367.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 125.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 147 (references).

Depth 4–5, length of head $3\frac{3}{4}$–$4\frac{1}{4}$, in length of body. Eye equal to or slightly greater than snout, $1\frac{1}{2}$ times interorbital width, $4\frac{1}{4}$–$4\frac{1}{2}$ in length of head. Profile descending rapidly in front of eye. A groove behind the orbits. Supraorbital ridges prominent. Snout blunt. Maxilla reaching to vertical from hind margin of eye. A band of smaller teeth behind the front row in both jaws, a chevron-shaped band on vomer. A fringed tentacle over eye. D XXXII–XXXIV 4–6, commencing above hind margin of preopercle, no crest, 1st or 1st and 2nd spines shortest, succeeding ones gradually lengthening, soft rays scarcely longer than the preceding spines. A II 21–24. P 13. V I 2, a minute 3rd ray sometimes present. Caudal rounded.

Length.—Up to 140 mm. (8 inches, Cuvier and Valenciennes).

Colour.—Yellowish, brownish, or greenish, usually with irregular dark cross-bands extending on to dorsal, a dark oval spot on opercle and a dark lunule on base of pectoral, margins of dorsal and anal light.

Locality.—Table Bay, False Bay.

Besides the characters mentioned under *taurus*, this species can usually be distinguished by the dark spot on the opercle.

Clinus acuminatus C. and V.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 370.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 124.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 146 (references).

Depth $4\frac{1}{2}$–5, length of head $3\frac{1}{2}$–4, in length of body. Eye equal to snout, nearly twice the interorbital width, about 5 in length of head. Profile straight. Snout rather pointed. Maxilla reaching to vertical from anterior third or middle of eye. A band of smaller teeth behind the front row in both jaws, a chevron-shaped band on vomer. A fringed tentacle over eye. D XXXI–XXXIII 5–7, commencing above hind margin of preopercle, no crest, 1st spine shortest, following ones gradually increasing in length, each spine terminated by a short filament, soft rays higher than preceding spines. A II 21–23. P 12. V I 2–3, 3rd ray, when present, very short. Caudal rounded.

Length.—Up to 130 mm.

Colour.—Greenish or brownish, speckled with fine white spots, with irregular cross-bands formed of small dark dots, cheek usually with an oblique dark stripe.

Locality.—Lüderitzbucht (S.W. Africa), Table Bay, False Bay.

Clinus latipennis C. and V.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 394.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 127.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 148 (references).

Depth $4\frac{2}{3}$, length of head $4\frac{1}{3}$, in length of body. Eye $1\frac{1}{3}$ times length of snout, twice interorbital width, $4\frac{3}{4}$ in length of head. Profile convex, with a slight depression behind the eye. Snout rather pointed. Maxilla reaching to vertical from middle of eye. A band of smaller teeth behind outer row in both jaws, a curved band on vomer. A fringed tentacle over eye. Posterior nostril tubular, rather prominent. D XXXIV 9, commencing behind level of hind margin of preopercle, no crest, anterior 5–6 spines rather low, succeeding spines gradually increasing, soft rays higher than preceding spines (but not " nearly twice " as high, as stated in Gilchrist and Thompson's key on p. 112). A II 26. P 13. V I 3, 3rd ray minute. Caudal subtruncate.

Length.—Up to 112 mm.

Colour (as preserved).—Brownish, with faint dark specks and cross-bands, pectorals and caudal with brown dots forming cross-bars.

Locality.—Table Bay, False Bay.

I have seen only one specimen of this species, the same as described by Gilchrist and Thompson.

Clinus robustus G. and T.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 128.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 149.

Depth $3\frac{3}{4}$–$4\frac{1}{2}$, length of head $3\frac{1}{2}$–$3\frac{4}{5}$, in length of body. Eye equal to snout, $1\frac{1}{3}$ times interorbital width, $5\frac{3}{4}$–6 in length of head. Profile slightly convex over the eyes. Interorbital space convex, without supraorbital ridges. Snout moderately pointed. Lips vertically corrugated. Maxilla to, or slightly beyond, vertical from hind margin of eye. A broad band of smaller teeth behind the front row in both jaws, and a broad band on vomer. A prominent fringed tentacle over eye. D XXXII–XXXIV 10–14, commencing slightly in advance of hind margin of preopercle, no crest, slightly notched or emarginate between 3rd and 4th spines, 1st spine shortest, soft rays higher than preceding spines. A II 27–28. P 12. V I 3, 3rd ray well developed. Caudal rounded. (Plate XXXV, fig. 2.)

Length.—Up to 450 mm.

Colour.—Greenish or brownish, mottled or spotted, with irregular dark cross-bands extending on to dorsal; fins streaked or spotted.

Locality.—Table Bay, False Bay.

Type in South African Museum.

This is the largest of the Cape Klip-fishes, and according to Gilchrist and Thompson possesses in a high degree the power of changing its colours to suit its surroundings.

Clinus venustris G. and T.

Multicoloured Klip-fish; Bont Klipvis.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 130.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 150.

Depth $3\frac{2}{3}$–$4\frac{1}{4}$, length of head $3\frac{2}{3}$–4, in length of body. Eye slightly greater than snout, twice interorbital width, 4 in length of head. Profile slightly convex, snout somewhat sharp. Maxilla reaching to vertical from anterior third or centre of eye. A band of smaller teeth behind the front row in both jaws, a chevron-shaped band on vomer. A fringed tentacle over eye. D XXXIX–XLI 2–3, commencing above hind margin of preopercle, no crest, 1st spine shortest, 4th–6th usually shorter than 2nd and 3rd, succeeding spines increasing in length. A II 24–27. P 13–14. V I 2. Caudal rounded.

Length.—Up to 130 mm.

Colour.—Varying shades of greenish, reddish, or brownish, mottled with light and dark spots; or variegated with red, blue, white, and yellow on body and vertical fins, especially the anal.

Locality.—False Bay.

Type in South African Museum.

Clinus dorsalis Blkr.

1860. Bleeker, Visch. v. d. Kaap., pp. 54, 72.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 132.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 148.

Depth $5\frac{1}{2}$–$6\frac{1}{4}$, length of head $4\frac{2}{3}$–5, in length of body. Eye equal to or slightly greater than snout, twice interorbital width, $4\frac{1}{2}$–5 in length of head. Profile straight, snout somewhat pointed. Maxilla reaching to vertical from anterior third of eye. A band of smaller teeth behind the front row in each jaw, a chevron-shaped band on

vomer. A fringed tentacle over eye. D XLIV–XLVI 1, commencing above, or slightly behind, hind margin of preopercle, no crest, 1st spine shortest, succeeding ones becoming gradually longer. A II 26–28. P 12. V I 2. Caudal rounded.

Length.—Up to 76 mm.

Colour.—Uniform green, yellow, or brown, often with darker streaks, or a row of dark spots along base of dorsal and a black patch on opercle ; sometimes a white streak from tip of snout to base of dorsal.

Locality.—Lüderitzbucht (S.W. Africa), Table Bay, False Bay.

This is the smallest of the South African Klip-fishes, and is easily distinguished by the size, elongate body, and single soft ray in the dorsal fin.

Clinus anguillaris C. and V.

Slangetje ; Kapitein Vis.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 390, pl. cccxxxiv.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 133.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 147.

Body elongate. Depth $6\frac{1}{2}$–$7\frac{1}{3}$, length of head $4\frac{4}{5}$–$5\frac{4}{5}$, in length of body. Eye equal to snout, $1\frac{1}{3}$–$1\frac{1}{2}$ times interorbital width, $5\frac{1}{2}$–6 in length of head. Profile straight. Snout rather blunt. Maxilla reaching to vertical from anterior margin or anterior third of eye. A band of smaller teeth behind the outer row in each jaw, a curved band on vomer. A fringed tentacle over eye. D XLVIII–XLIX 3–4, commencing above hind margin of preopercle, no crest, 1st spine shortest, succeeding ones gradually lengthening, soft rays slightly longer than adjacent spines. A II 33–36. P 13–14. V I 3, 3rd ray well developed. Caudal rounded. Cheeks scaly.

Length.—Up to 285 mm.

Colour.—Various shades of yellow, brown, greenish, reddish, mottled with darker spots, blotches, or bars.

Locality.—False Bay.

Clinus striatus G. and T.

Striped Klip-fish.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 134.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 149.

Body elongate. Depth $6\frac{1}{2}$–7, length of head $4\frac{1}{3}$–$4\frac{2}{3}$, in length of body. Eye about equal to snout, twice interorbital width, $4\frac{1}{2}$–5 in length of head. Profile slightly convex, snout rather pointed. Maxilla reaching to vertical from anterior third of eye. A band of smaller teeth behind the front row in both jaws, a curved band on vomer. A fringed tentacle over eye. D XLI–XLIV 2–3, commencing above hind margin of preopercle, no crest, 1st spine shortest, succeeding ones increasing gradually in length, soft rays slightly longer than adjacent spines. A II 31. P 13. V I 3, 3rd ray minute. Caudal rounded. Cheeks scaly.

Length.—Up to 160 mm.

Colour.—Reddish-brown, parallel longitudinal lines of pinkish-brown and white from eye and pectorals to tail; a white stripe from tip of snout to base of dorsal; a brown band from eye to snout.

Locality.—False Bay.

Type in South African Museum.

Distinguished from *anguillaris* by the more pointed snout, the feebly developed 3rd ray of ventral fin, and the fewer dorsal and anal rays.

Clinus heterodon C. and V.

Grass Klip-fish.

1836. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. xi, p. 394.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 136 (*graminis*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 148 (*graminis* and *heterodon*, references).

Depth $3\frac{1}{3}$–$4\frac{1}{3}$, length of head $4\frac{1}{3}$–$4\frac{1}{2}$, in length of body. Eye slightly greater than snout, $1\frac{1}{2}$ times interorbital width, $4\frac{1}{2}$–5 in length of head. Profile straight, snout somewhat pointed. Maxilla reaching to vertical from anterior third of eye. A band of smaller teeth behind the front row in each jaw, a curved band on vomer. No tentacle over eye. D XXX–XXXIII 5–6, commencing above hind margin of preopercle, first 3 spines strong, longer than 4th, but not forming an elevated crest, soft rays higher than preceding spines. A II 21–24. P 12. V I 3, 3rd ray well developed. Caudal rounded. Scales comparatively large, very distinct, imbricated.

Length.—Up to 150 mm.

Colour.—Variable; bronzy, green, red, or brownish, with dark blotches along base of dorsal, sometimes with longitudinal dark bands or spots, or a row of white spots; margin of anal often whitish.

Locality.—False Bay.

Type of *graminis* in South African Museum.

Bearing in mind the large amount of time devoted by the late W. W. Thompson to intensive collecting of Klip-fishes around the shores of the Cape Peninsula, resulting in the rediscovery of all the earlier described species (except *heterodon*, in the opinion of Gilchrist and Thompson) and the discovery of several new species, it seems strange that these authors did not recognise the specimens they described as *graminis* as being the species *heterodon* for which they were searching. The original description is certainly short, but not more inadequate than, *e.g.* that of *acuminatus*, and applies exactly to *graminis*.

Clinoporus n. g.

Closely resembling *Clinus*. Hook on inner margin of shoulder-girdle present. No scales. Lateral line with a series of short transverse, alternating branches, each opening by a pore; a single pore at end of lateral line between ends of dorsal and anal fins.

The character of the lateral line, which resembles that found in *Xiphidion*, distinguishes this genus from *Clinus* and its subgenera.

Clinoporus biporosus (G. and T.).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 137.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 147.

Body elongate, moderately compressed, naked, the skin transversely rugulose. Depth 6–6½, length of head 5–5½, in length of body. Eye slightly greater than snout, twice interorbital width, 4½–4¾ in length of head. Profile slightly convex, a median ridge on snout. Lips thick. Maxilla reaching to vertical from anterior third of eye. A band of smaller teeth behind the front row in both jaws, a curved band on vomer. No tentacle over eye. Mucous pores on head conspicuous. D XXXIX–XL 3, commencing above hind margin of preopercle, 1st spine shortest, succeeding ones increasing in length, soft rays shorter than preceding spines. A II 27–28. P 11–12. V I 3, 3rd ray minute. Caudal rounded.

Length.—Up to 125 mm.

Colour.—Uniform deep crimson, brownish, or yellowish.

Locality.—False Bay, down to 14 fathoms.

Type in South African Museum.

Gen. Petraites Ogilby.

1885. Ogilby, Proc. Linn. Soc. N.S.W., vol. x, p. 226.

Resembling *Clinus* in all respects except that the anterior crest of the dorsal is separate from the rest of the fin. The 1st dorsal spine commences behind the vertical from hind margin of eye.

This genus is scarcely distinct from *Clinus*. The membrane behind the 3rd dorsal spine reaches to the base of the 4th spine, and it is therefore questionable whether the crest can be described as really separate from the rest of the fin. In *Cristiceps* the crest arises over the eye, and is clearly separated from the rest of the fin.

There is no question that *laurentii* and *mentalis* should be placed together in the same genus.

Key to the South African species.

1. With supraorbital tentacles . . . . . *argentatus.*
2. Without supraorbital tentacles.
   - *a.* A triangular flap on chin. Soft dorsal rays 7 . . . *mentalis.*
   - *b.* No flap on chin. Soft dorsal rays 4 . . . . . *laurentii.*

**Petraites argentatus* (Risso).

1810. Risso, Ichth. Nice, p. 140.

1860. Bleeker, Nat. Tydschr. Ned. Ind., vol. xxi, p. 71 (*Clinus dubius*).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 138.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 150 (references).

Depth 6, length of head $5\frac{1}{3}$ in total length (? including caudal). Eye equal to snout, greater than interorbital width, 5 in length of head. Snout subconical, lower jaw somewhat prominent. Lips well developed, fleshy. A band of smaller teeth behind the outer row in both jaws, a transverse band on vomer. A small simple tentacle over eye. D III . XXIX–XXX 3-4, commencing above hind margin of preopercle, spines of the crest rather longer than the other spines, soft portion united with caudal. A II 19–20. P 9. V I 2. Caudal truncate.

Length.—75 mm.

Colour.—Brownish or yellowish, more or less marbled or banded with darker; a series of silvery spots along the sides, sometimes extending on to cheeks.

Locality.—Cape seas.

Distribution.—Mediterranean.

Günther records this species from the Cape, but it has never been rediscovered here.

Petraites mentalis (G. and T.).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 139.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 150.

Depth $4\frac{1}{2}$, length of head $3\frac{4}{5}$, in length of body. Eye $1\frac{1}{2}$ times length of snout, $1\frac{1}{3}$ times interorbital width, 6 in length of head. Profile straight. Snout rather pointed, lower jaw projecting slightly beyond upper. Lips fleshy and membranous; a triangular flap at point of chin. Maxilla reaching to vertical from anterior margin of eye. A band of smaller teeth behind the outer row of strong teeth in both jaws, a curved row of teeth on vomer, with a second row behind which is interrupted in the middle. No tentacle over eye. D III. XXXIII 7, commencing above hind margin of preopercle, crest $\frac{2}{5}$ length of head, soft rays slightly higher than preceding spines, membrane not extending to base of caudal. A II 29. P 12. V I 3, 3rd ray well developed. Caudal rounded.

Length.—220 mm.

Colour.—Light brown, mottled with darker, sometimes with light cross-bars.

Locality.—East London.

Type and only known specimen (♀) in South African Museum.

Petraites laurentii (G. and T.).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 120.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 414.

Depth 4–$4\frac{1}{2}$, length of head $3\frac{2}{3}$–$3\frac{4}{5}$, in length of body. Eye $1\frac{1}{3}$ times snout, twice interorbital width, $3\frac{2}{3}$–4 in length of head. Profile slightly convex. Snout subconical, lower jaw not projecting. Lips rather thick. Maxilla reaching to vertical from anterior third of eye. A band of smaller teeth behind the strong front row in both jaws; a single curved row on vomer. No tentacle over eye. D III . XXVII–XXIX 4–5, commencing above hind margin of preopercle, crest about $\frac{2}{5}$ length of head, soft rays slightly higher than preceding spines, membrane reaching almost to base of caudal. A II 20–22. P 12. V I 3, 3rd ray distinct but small. Caudal slightly rounded.

Length.—Up to 125 mm.

Colour.—Brown, with about 8 dark cross-bars continued on to dorsal and anal fins, pectorals and caudal more or less distinctly banded, an oblique dark bar from eye across cheek.

Locality.—Natal coast.

Type in South African Museum.

Gen. Gillias Everm. and Marsh.

1899. Evermann and Marsh, Rep. U.S. Fish. Comm., vol. xxiv, p. 357.

Scales moderate sized, ctenoid. Head and belly scaly. Three separate dorsal fins, the 1st and 2nd spinous, the 3rd of soft rays. Lateral line parallel with the back, interrupted, the tubules ceasing below the 3rd dorsal, but continued two rows lower down as a series of incised scales. A tentacle over eye. No hook on inner margin of shoulder-girdle.

This genus is regarded merely as a subgenus of *Tripterygion* by some authors, but the scaly head is such a distinctive feature, at any rate in the South African form, that generic rank seems justified.

Gillias capensis (G. and T.).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 140 (*Tripterygium c.*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 151 (*Tripterygium*).

Depth 3½–4, length of head 3, in length of body. Eye nearly twice length of snout, twice interorbital width, 3⅓–3½ in length of head. Profile descending rather abruptly in front of eye. Snout short. Lips not very thick. Maxilla reaching to vertical from anterior third of eye. A band of fine teeth behind the front row, in the lower jaw some larger teeth mixed in with the smaller ones, a single row on vomer, extending on to the palatines. A fringed tentacle over eye, and a smaller one on anterior nostril. D IV+XIV+10–11, 1st dorsal commencing above hind margin of preopercle. A II 21–22. P 16, the upper rays bifid. V I 2. Scales on belly and over entire head; those on upper half of head ctenoid, on lower half, throat, and branchiostegal rays becoming papillose: l.l. tubules 21–22+incised scales 15–16, the interruption occurring below 2nd soft dorsal ray; l.tr. $\frac{5}{12}$.

Length.—Up to 67 mm.

Colour.—Greyish or reddish, with irregular dark cross-bars.

Locality.—False Bay, 5–14 fathoms.

Type in South African Museum.

Gen. Enneapterygius Rüpp.

1835. Rüppell, Neue Wirbelt. Fische, p. 2.

Scales moderate or rather large, ctenoid. Head naked (? belly also). Three separate dorsal fins, 1st and 2nd spinous, 1st at least as high as 2nd. Lateral line following curve of back, interrupted, the tubules ceasing below middle of 2nd dorsal, but continued two rows lower down as a series of incised scales. A tentacle over eye. No hook on inner margin of shoulder-girdle.

A genus which is also included by some authors in *Tripterygion*, from which, however, it differs in the interrupted lateral line. The relative heights of the 1st and 2nd dorsal fins, as well as the character of the lateral line, differentiate this genus from *Helcogramma*.

**Enneapterygius pusillus* Rüpp.

1835. Rüppell, *loc. cit.*, p. 2, pl. i, fig. 2.

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 498.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322 (name only).

Depth 4, length of head 3, in length of body (these numbers taken from Rüppell's figure; Klunzinger gives 6 and 4 respectively, *including* the caudal fin in the length). Eye greater than snout, 2½–3 in length of head. Profile abruptly descending in front of eyes. Snout short, but somewhat pointed. Maxilla reaching to vertical from anterior third of eye. A band of teeth in both jaws, the outer ones slightly larger. A small simple tentacle over eye. D III+XI–XII+ 8–10, 1st dorsal higher than 2nd, 2nd higher than 3rd. A 16–18. V I 2. Caudal rounded. Scales absent from head: l.l. 33 (23 in Rüppell's figure), of which 7 (Rüppell) bear tubules.

Length.—23 mm.

Colour.—Greenish, black specks on head, a dark brown stripe under eye across throat, margined with blue; fins greyish, transparent.

Locality.—Natal coast.

Distribution.—Red Sea.

Gen. Helcogramma McC. and W.

1918. McCulloch and Waite, Rec. S. Austr. Mus., vol. i, p. 51.

Scales moderate sized, ctenoid. Head and belly naked. Three separate dorsal fins, the 1st and 2nd spinous, the 1st considerably lower than 2nd. Lateral line curving downwards from shoulder to middle of side, ending below end of 2nd dorsal, no secondary series of

incised scales. Orbital tentacle present or absent. No hook on inner margin of shoulder-girdle.

This genus might also be regarded as a subgenus of *Tripterygion*, but differs in the character of the lateral line. Weber (1913, Siboga Exp. Monogr. 57, p. 546) notes that *trigloides* Blkr. and *obtusirostre* Klunz. occupy in this respect a somewhat isolated position among the species of *Tripterygion*. McCulloch and Waite assign *medium* Gnthr. to their genus as well as their type species *decurrens* McC. and W.

Helcogramma obtusirostre (Klunz.).

1871. Klunzinger, Verh. Zool. Bot. Ges. Wien, vol. xxi, p. 498.

1918. Regan, Ann. Durban Mus., vol. ii, pt. 2, p. 77.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

Depth $4\frac{3}{4}$–5, length of head $3\frac{1}{3}$–$3\frac{1}{2}$, in length of body. Eye slightly greater than snout, 3 times the interorbital width, 3 in length of head. Profile abruptly descending in front of eyes. Snout short, blunt. Jaws equal. Maxilla reaching to vertical from anterior third of eye. Teeth in bands on both jaws, the front middle ones larger, a band on vomer. No orbital tentacle. D III+XIII+10, 1st dorsal considerably lower than 2nd. A I 18–19. P 17. V I 2. Caudal slightly rounded. Scales absent on head, belly, and a space around base of 1st and 2nd dorsals, which latter space is transversely striate: l.l. 36–38, of which 20–21 bear tubules; l.tr. $\frac{6}{12}$.

Length.—Up to 45 mm.

Colour.—Brownish or greenish, with darker cross-bands, the bands either broad or narrow, when narrow in pairs; head more or less completely covered with small black specks.

Locality.—Natal coast.

Distribution.—Red Sea.

This species seems to be very closely allied to *trigloides* Blkr.

One of the South African Museum specimens is coloured in a very similar manner to *T. hemimelas* Kner, except that the caudal peduncle is not black, and there is no white spot on the caudal fin.

Fam. 3. Congrogadidae.

Body elongate, with very small scales. Mouth protractile, with strongly developed lips. Teeth in a single series in each jaw, palate usually toothless. Dorsal and anal fins elongate, composed of soft rays, sometimes a single spine at commencement of dorsal. Caudal

confluent with dorsal and anal. Ventrals, if present, jugular, with one or two filamentous rays. Pseudobranchiae present. Gill-membranes either free from, or united with, isthmus.

A small family of elongate Blenny-like fishes from the Indo-Pacific region. There is one representative in South African waters.

Gen. Halidesmus Gnthr.

1871. Günther, Proc. Zool. Soc. Lond., p. 668.

1912. Regan, Ann. Mag. Nat. Hist., (8), vol. x, p. 268.

1916. Gilchrist and Thompson, Mar. Biol. Rep., vol. iii, p. 57 (*Porogrammus*).

Body elongate, compressed. A few teeth in a transverse band on vomer. A small spine at commencement of dorsal. Gill-membranes joined across throat, free from isthmus. Three distinct lateral lines, each with a double row of pores, except where the lines from opposite sides are adjacent in the middle line (*i.e.* on nape, belly, and immediately above and below base of pectoral) ; an oblique branch connects the upper and middle lines just behind the scapular region ; the lower line divides into two at extremity of ventral fins, uniting again above the vent. Isolated pores along edge of preopercle and around orbit. Ventrals very short, each of 2 rays. Dorsal and anal confluent only with base of caudal. Branchiostegals 6.

Examination of the specimens in the South African Museum has enabled me to give the above emended diagnosis of this genus, with which Gilchrist and Thompson's genus *Porogrammus* is clearly synonymous. The presence of vomerine teeth and 6 branchiostegals is confirmed, whereas Regan's statement (Ann. Mag. Nat. Hist., (8), vol. x, p. 268, 1912) that there are only 4 branchiostegals and that the gill-membranes are joined to the isthmus is erroneous. Pseudobranchiae are present.

One cannot help suspecting that the artist who drew Gilchrist and Thompson's figure has improved upon the specimen in drawing the dorsal and anal fully confluent with the caudal ; the figure in this respect does not agree with the description given in the diagnosis of the genus and the species. The caudal rays are branched as in Günther's figure.

Halidesmus scapularis Gnthr.

1871. Günther, *loc. cit.*, p. 668, pl. lxvii, fig. B.

1916. Gilchrist and Thompson, *loc. cit.*, p. 57, fig. (*Porogrammus capensis*).

1917. *Id.*, Ann. Durban Mus., vol. i, p. 416 (*Halidesmus scapularis*).

Depth $9\frac{1}{2}$–$14\frac{1}{2}$ (Günther says 16, though his figure shows $12\frac{1}{2}$), length of head $5\frac{1}{5}$ (young)–$8\frac{3}{4}$ (Günther says 10), in length of body. Snout about as long as eye, which is $3\frac{3}{5}$–5 in length of head. Maxilla reaching to vertical from anterior third of eye. Gill-rakers 7–8 on lower part of anterior arch. D I 54–64. A 42–48. C 11. Caudal rounded. (Plate XXXII, fig. 4.)

Length.—Up to 125 mm.

Colour.—Yellowish or dark brown, with obscure dark cross-bands, dorsal and anal dark posteriorly, sometimes spots on hinder part of dorsal fin and across caudal fin, a black ovate scapular spot above the pectoral fin usually present (not recorded in *Porogrammus capensis*).

Locality.—False Bay, Algoa Bay, Natal coast, down to 50 fathoms.

Type of *Halidesmus* in British Museum, of *Porogrammus* ? lost.

Fam. 4. Zoarcidae.

Body elongate, more or less eel-like, naked, or with very small, embedded, cycloid scales. Mouth not protractile. Lips not strongly developed. Conical teeth in jaws, sometimes also on vomer and palatine. Dorsal and anal elongate, composed of soft rays, a few of the posterior rays of dorsal sometimes spinous. Caudal confluent with dorsal and anal. Ventral fins, when present, small, jugular. Pseudobranchiae present. Gill-membranes attached to isthmus; gill-openings very variable in size. Lateral line moderately distinct, or nearly or quite obsolete. Pyloric caeca rudimentary.

Chiefly Arctic and Antarctic forms. Some are found at considerable depths. Several are known to be viviparous.

In America these fishes are termed Eel-pouts.

Key to the South African genera.

1. Ventral fins and scales present. Gill-opening wide, or very wide.
   a. Moderately elongate. No scutes along bases of dorsal and anal *Lycodes.*
   b. Very elongate. A row of scutes along bases of dorsal and anal *Lycodonus.*
2. Ventrals and scales absent. Gill-opening reduced to a small slit *Melanostigma.*

Gen. Lycodes Reinh.

1838. Reinhardt, Kongl. Danske Selsk. Afh., vol. vii, p. 147.

Body moderately elongate, tapering behind. Scales minute, circular, embedded. Mouth horizontal, lower jaw included in upper.

Teeth conical on jaws, vomer, and palatines, in single series or in bands. Gill-opening wide. Dorsal fin even in height throughout, without spines. No scutes along base of dorsal and anal. Ventrals rudimentary, each consisting of a single short fleshy projection. Pectoral broad. No air-bladder. Branchiostegal rays 6. No barbels.

Lycodes frigidus Coll.

1878. Collett, Forh. Vid. Selsk. Christ., No. 14, p. 45.

1880. *Id.*, Norsk. Nordh. Exped. Fisk., p. 96, pl. iii, figs. 23, 24.

1895. Smitt, Skand. Fish., vol. ii, p. 610, fig. 146.

Depth 8 (adult)–11 (young), length of head $4\frac{2}{3}$ (adult)–$5\frac{1}{4}$ (young), in length of body. Eye in young about equal to snout, twice interorbital (or 3 times the *bony* interorbital) width, $3\frac{1}{2}$ in length of head ; in adult about $2\frac{3}{4}$ in snout, $1\frac{1}{2}$ in interorbital width, 7 in length of head. Intermediate specimens with correspondingly intermediate proportions. Length of head a little over half the distance from tip of snout to vent, which distance is $1\frac{1}{2}$–$1\frac{3}{4}$ in the distance from vent to base of caudal fin. Cleft of mouth extending to below anterior margin of eye. Teeth in young in single series in both jaws, palatines, and vomer ; in older specimens, one or two additional rows in the front of the jaws, and some additional teeth on the vomer, are developed. Gill-openings wide, extending almost to bases of ventral fins. D ca. 100, commencing above middle of pectoral. A ca. 90. P 21. Lateral line running from shoulder obliquely down to near vent and along base of anal, distinct ; in some young specimens a very indistinct additional line along base of dorsal, but never traceable throughout its entire length.

Length.—Up to 430 mm.

Colour.—Uniform purplish-brown, slaty or lead-coloured ; mouth, throat, and gill-cavities fuscous.

Locality.—Off Cape Point, 345–900 fathoms.

Distribution.—N. Atlantic and Arctic Oceans, down to 1333 fathoms.

These specimens appear to differ in no way from Collett's species as diagnosed and figured by Smitt. Goode and Bean's figure (1895, Ocean. Ichthyol., fig. 274), however, differs considerably both in the size of the head and the position of the lateral line, and must evidently refer to another species.

Young specimens of this genus have more than once been described as distinct species. In the present case there is no doubt that the youngest and oldest specimens are conspecific. The young specimens bear considerable resemblance to *macrops* Gnthr. 1883.

Gen. Lycodonus G. and B.

1882. Goode and Bean, Bull. Mus. Comp. Zool., vol. x, p. 208.

Body very elongate, eel-like. Scales minute, circular, embedded. Mouth horizontal, lower jaw included in upper. Teeth on jaws, vomer, and palatine. Gill-opening rather narrow. Dorsal fin even in height, without spines. A series of bony scutes along each side of bases of dorsal and anal fins. Ventrals rudimentary, each consisting of a single short fleshy projection. Pectoral broad. Air-bladder absent. Branchiostegal rays 4 (or 5 ?). Pseudobranchiae present, but very small. No barbels. Lateral line absent.

Lycodonus vermiformis n. sp.

Body very slender. Depth 22–25, length of head about 10, in length of body. Eye equal to (young) or rather less than (adult) snout, at least twice interorbital width, 4 (young)–4¾ (adult) in length of head. Length of head not quite half distance from tip of snout to vent, which distance is about 4 in distance from vent to tip of tail. Cleft of mouth extending to below anterior margin of eye. Teeth in single rows on jaws, vomer, and palatine, a few smaller teeth behind the outer ones in front of each jaw. Gill-openings extending downwards to level of bottom of bases of pectorals. D ca. 115, commencing above end of pectoral. A ca. 100. Both dorsal and anal flanked by the same number of bony scutes as there are rays (the dorsal scutes not commencing in front of the 1st ray). P 14–15. Lateral line absent. A row of large mucous pores along side of head below eye, and a similar row on under surface of head extending on to lower jaw. (Plate XXXV, fig. 3.)

Length.—Up to 270 mm.

Colour (as preserved).—Yellowish-brown, belly blackish, throat and gill-cavities fuscous.

Locality.—Off Cape Point, 460–630 fathoms.

Type in South African Museum.

These specimens evidently represent a species distinct from *mirabilis* G. and B. from the east coast of North America. Besides the differences in fin formula, the dorsal scutes in the latter commence much further forward than in *vermiformis*, and the first 10–11 appear to be unaccompanied by rays. I am unable to find more than 4 branchiostegal rays.

Gen. Melanostigma Gnthr.

1881. Günther, Proc. Zool. Soc. Lond., p. 20.

Body moderately elongate. Skin naked, loose and flabby, enveloping the dorsal and anal fins. Mouth small, oblique. Teeth on jaws, vomer, and palatine in one or two series. Gill-opening reduced to a small aperture above base of pectoral. Dorsal fin even in height, without spines. No scutes along bases of dorsal and anal. Ventrals absent. Pectoral narrow. Air-bladder ? Branchiostegal rays ? No barbels.

**Melanostigma gelatinosum* Gnthr.

1881. Günther, *loc. cit.*, p. 21, pl. ii, fig. A.

1887. *Id.*, Challeng. Rep., vol. xxii, p. 82.

1895. Goode and Bean, Ocean. Ichth., p. 314, fig. 284.

1898. Jordan and Evermann, Fish. Mid. N. Amer., vol. iii, p. 2479.

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 20.

Depth about $8\frac{1}{2}$, length of head $6–7\frac{1}{2}$, in length of body. Eye greater than snout, $3\frac{1}{2}$ in length of head. Length of head rather less than half distance between tip of snout and vent, which distance is about half distance from vent to tip of tail. Cleft of mouth extending to below anterior third of eye. Fin formula not stated.

Length.—Up to 140 mm.

Colour.—Greyish, back purplish, sides with purplish marblings, tail black.

Locality.—Off Table Bay, 1400 fathoms.

Distribution.—Straits of Magellan, 24 fathoms; east coast of North America, 319–641 fathoms.

Gilchrist makes no remarks on the structure of the Cape specimen.

Fam. 5. Brotulidae.

Body elongate, naked, or with small cycloid scales. Mouth often protractile. Lips not strongly developed. Teeth conical or villiform, in bands on jaws and usually also on vomer and palatine. Dorsal and anal elongate, composed of soft rays. Caudal confluent with dorsal and anal (except in *Dinematichthys* and *Brosmophycis*). Ventral fins, when present, jugular, reduced to 1–2 rays. Pseudobranchiae small or wanting. Gill-membranes separate and free from isthmus (except in *Dermatopsis*); gill-openings wide. Lateral line

single or triple, complete, interrupted, or partially or entirely obsolete. Pyloric caeca usually few. Air-bladder present.

A numerous family of fishes allied to the *Zoarcidae*, and closely resembling the latter in external appearance. The freedom of the gill-membranes is usually a certain differential character. Internally the two families are at once distinguished by the number of radialia (basalia) or supports to the dorsal and anal fins; in the *Zoarcidae* these correspond in number to the neural and haemal spines of the vertebrae, in the *Brotulidae* they are more numerous than these. In this respect *Selachophidium* has been examined and found to be correctly placed in the present family.

Brotulid fishes are widely distributed. Some are shore fishes, but the majority are deep-water forms; some of the latter are highly aberrant. There are also a few blind cave-fishes from Cuba which are included in this family.

Some forms, e.g. *Cataetyx* and the blind Cuban fishes, are known to be viviparous.

Cockerell (1916, Ann. Mag. Nat. Hist., (8), vol. xviii, p. 317) has given a comparative account of the scales of several members of this family.

Key to the South African genera.

I. Scaly. Eyes normal.
  A. Ventrals inserted below hind edge of preopercle or thereabouts.
    1. Pectoral rays all similar.
      a. Lateral line single, distinct (anteriorly at least).
        i. Each ventral a single filament.
          α. Head scaly. Operculum with 1 spine.
            * Lateral line distinct throughout . *Selachophidium*.
            ** Lateral line obsolete posteriorly . *Cataetyx*.
          β. Head naked. Operculum with 2 spines . *Diplacanthopoma*.
        ii. Each ventral bifid . . . . . *Neobythites*.
      b. Lateral line triple . . . . . *Porogadus*.
    2. Lower pectoral rays elongate . . . . . *Dicrolene*.
  B. Ventrals inserted below eye . . . . . *Hoplobrotula*.
II. Scaleless. Eye covered over by skin . . . . . *Barathronus*.

Gen. Selachophidium Gilch.

1903. Gilchrist, Mar. Invest. S. Afr., vol. ii, p. 209.

Body compressed. Head (including snout and opercles) and body scaly. Snout swollen, projecting. Lower jaw included in upper.

Teeth villiform, in bands on jaws, vomer, and palatines. No barbels. Eye large. Anterior nostril not at tip of snout. Opercle with one spine. Pseudobranchiae present. Gill-rakers fairly long on posterior part of arch. Lateral line single, distinct and continuous to tail. Pectoral without elongated rays. Ventrals close together, inserted below preopercle, each consisting of a single ray. Branchiostegal rays 8. Pyloric caeca obsolete. Vent antemedian.

Selachophidium guentheri Gilch.

1903. Gilchrist, *loc. cit.*, p. 209, pl. xvii.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 476.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 152.

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 77.

Depth $5\frac{1}{4}$–$6\frac{1}{2}$, length of head $5\frac{1}{2}$–$5\frac{2}{3}$, in length of body. Eye equal to snout, $1\frac{1}{3}$ times the interorbital width, $3\frac{1}{3}$–$3\frac{1}{2}$ in length of head. No large muciferous cavities on head. Maxilla reaching to vertical from hind margin of eye. Gill-rakers 22 on lower part of anterior arch, the 5 or 6 anterior ones being tubercular. D ca. 115, commencing above middle of pectoral. A 85–90. P 26–27. Lateral line distinct almost to tip of tail (in well-preserved specimens), about 12 scales between it and dorsal; scales on base of dorsal anteriorly, none on anal; whole head, including suborbital, snout, lower jaws, and branchiostegals, scaly. (Plate XXXV, fig. 4.)

Length.—Up to 300 mm.

Colour.—Uniform brownish, dorsal and anal fins posteriorly darker, almost black; mouth and gill-cavities purplish-black.

Locality.—Off Cape Point, East London, and Natal coast, 150–537 fathoms.

Type in South African Museum.

Gen. Cataetyx Gnthr.

1887. Günther, Challeng. Rep., vol. xxii, p. 104.

Body compressed. Head depressed in front. Head (except tip of snout) and body scaly. Snout not projecting. Jaws about equal. Teeth villiform, in bands on jaws, vomer, and palatines; no larger teeth in lower jaw. No barbels, but some short cirri on upper lip in front. Eye rather small. Anterior nostril at end of snout, with a short tube. Opercle with 1 spine. Pseudobranchiae small in

young, absent in adult. Gill-rakers reduced to 3, well developed, the rest of the arch occupied with granulate plates. Lateral line single, indistinct and interrupted. Pectoral broad, without elongate rays. Ventrals close together, inserted below hind margin of opercle, each consisting of a single filament. Branchiostegal rays 8–9. Pyloric caeca represented by two broad pouch-like projections. Vent postmedian (in adult). Male with an anal papilla (penis). Viviparous.

The above diagnosis is based on the adult specimen in the South African Museum. *C. simus* Garm., from the Gulf of Panama, also falls within the diagnosis, although the vent is not quite so markedly postmedian. By this latter character the South African specimens and *C. simus* (adults) are sharply distinguished from the smaller and presumably immature specimens of *messieri* Gnthr. and *rubrirostris* Gilb., where the vent is median or antemedian. Two young specimens, found in South African waters, have the vent median, and it is reasonable to assume that they are conspecific with the adult specimen. Consequently, until evidence to the contrary is forthcoming, it must be assumed that the post-anal portion of the body decreases relatively to the pre-anal, whereby the vent assumes a postmedian position in the adult.

Judging by the South African specimens, there appears to be also an increase in the number of pectoral rays in the adult.

Cataetyx messieri (Gnthr.).

1878. Günther, Ann. Mag. Nat. Hist., vol. ii, p. 19 (*Sirembo m.*).

1887. *Id.*, *loc. cit.*, p. 104, pl. xxiii, fig. B.

1904. Gilchrist, Mar. Invest. S. Afr., vol. iii, p. 141, pl. viii, fig. 46; pl. xi, figs. 57, 58 (eggs, embryos, viviparity).

1906. *Id.*, *ibid.*, vol. iv, p. 159.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 416 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 151 (references).

Depth $4\frac{1}{2}$ (in young and in gravid ♀), length of head $3\frac{1}{2}$ (young)–$3\frac{4}{5}$ (♀), in length of body. Eye in young nearly twice snout, equal to interorbital width, 6 in length of head; in adult, $1\frac{1}{2}$ in snout and in interorbital width, $7\frac{1}{2}$ in length of head. Five slit-like muciferous pores on infraorbital, 3 on ramus of lower jaw, 4 on hind margin of preopercle. Some short cirri on upper lip under and between the anterior nostrils (adult). Maxilla reaching beyond hind margin of eye by about $\frac{2}{3}$ diameter of eye. Teeth villiform, some of the posterior

ones in lower jaw in young slightly larger than the rest. Two or three short pseudobranchial filaments in young. D 100–107, commencing above middle or hind end of pectoral. A 70–75. P 25 (young)–30 (adult). Length of head in young $1\frac{3}{5}$–$1\frac{4}{5}$ in distance from tip of snout to vent, in adult $2\frac{1}{3}$. Distance from tip of snout to vent about equal to distance from vent to base of caudal fin in young, in adult $1\frac{1}{3}$ times the latter distance. Lateral line becoming obsolete in posterior quarter of body; about 20 scales between it and base of 1st dorsal ray.

Length.—(♀) 630 mm.

Colour.—Uniform brown.

Locality.—Off Cape Point, 460–700 fathoms (adults and young); off East London, 310 fathoms (young); Natal coast, 50 fathoms (young).

Distribution.—Chile, 345 fathoms.

The ♂ specimen mentioned by Gilchrist is no longer in the " Pieter Faure " collection, and the above description is based solely on the ♀ specimen and two young specimens, 31 and 44 mm. in length, one from off Cape Point, the other from off East London.

Gen. Diplacanthopoma Gnthr.

1887. Günther, Challeng. Rep., vol. xxii, p. 115.

Body compressed, strongly tapering posteriorly, scaly. Head naked, with thin bones and wide muciferous canals. Snout not swollen, upper jaw slightly overlapping lower. Teeth villiform, in bands on jaws, vomer, and palatines. No barbels. Eye moderate. Nostrils far apart, the anterior at end of snout. Opercle with 2 spines, one pointing backwards, one behind angle of preopercle pointing downwards. Pseudobranchiae small or absent. Gill-rakers lanceolate, often reduced in number, widely set. Lateral line single, indistinct. Pectoral without elongate rays. Ventrals close together, inserted below hind margin of opercle, each consisting of a single ray. Branchiostegals 8 (or 6). Pyloric caeca absent. Vent slightly antemedian. Male with intromittent organ. Viviparous.

**Diplacanthopoma nigripinnis* G. and v. B.

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 20, pl. iv, fig. 2.

Depth $3\frac{4}{5}$ ($4\frac{1}{4}$ in figure), length of head 4, in length of body. Eye

1½ in snout, 5 in length of head. Posterior nostrils contiguous with anterior margin of eye. Maxilla reaching to below hind margin of eye. Opercular spines covered with skin (?). Fin formula not given. Lateral line visible anteriorly only. Length of head about equal to its distance from vent, and less than distance between base of ventrals and vent. Branchiostegals ?

Length.—160 mm.

Colour.—Brownish, fins darker.

Locality.—Natal coast, 700 fathoms.

Type in coll. Govt. Mar. Survey.

This species appears to differ from the others in its shorter head. It has certain resemblances to *riversandersoni* Alck. from the Indian Ocean, of which it may possibly be an immature specimen.

Gen. Neobythites G. and B.

1885. Goode and Bean, Proc. U.S. Nat. Mus., vol. viii, p. 600.

Body compressed, tapering posteriorly, scaly. Head scaly. Snout slightly projecting, upper jaw slightly overlapping lower. Teeth villiform, in bands on jaws, vomer, and palatines. No barbels. Eye moderate or rather large. Nostrils moderately far apart, the anterior near tip of snout, the posterior near or contiguous with eye. One or two weak spines at angle of preopercle ; opercle with one spine. Pseudobranchiae present but small. Gill-rakers lanceolate, rather widely spaced. Lateral line single, more or less obsolete posteriorly. Pectoral without elongate rays. Ventrals close together, each consisting of two rays, inserted below hind margin of preopercle. Branchiostegals 8. Pyloric caeca present, short.

Smith and Radcliffe (1913, Proc. U.S. Nat. Mus., vol. xliv, p. 139) consider that *Watasea* J. and S. is insufficiently distinguished from *Neobythites* by having a second small spine above the first on the opercle.

Neobythites analis n. sp.

1914. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xiii, pt. 3, p. 89 (*macrops*, non Günther).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 416 (*macrops*, non Günther).

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 19 (*macrops*).

Depth 5½–5¾, length of head 4¾–5, in length of body. Eye equal

to snout and to interorbital width, 4½ in length of head. Maxilla reaching to vertical from hind margin of eye. Gill-rakers 14–15 on lower part of anterior arch, the posterior 6–7 long, the anterior ones mere knobs. Pseudobranchiae 4 filaments. Posterior nostril near, but not contiguous with, eye. D ca. 100, commencing above axil of pectoral. A ca. 85. P 26. Ventrals about ½ distance between their bases and vent, which distance is slightly greater than length of head; each pair of rays united in their basal third, inner ray longer than outer. Lateral line distinct to end of tail (in well-preserved specimens); 7–8 scales between lateral line and anterior rays of dorsal fin. Pyloric caeca in two rows of 5 each along mesenteric attachment of gut, none around the pylorus.

Length.—Up to 170 mm.

Colour.—Uniform brownish, dorsal fin light, caudal dusky, anal light with a black margin.

Locality.—Algoa Bay and Natal coast, 46–700 fathoms.

Type in South African Museum.

This species, although very close to *macrops* Gnthr. from the Indo-Pacific, is readily distinguished by the shorter head relative to the distance between base of ventrals and vent, the arrangement and number of the pyloric caeca, and the coloration. The black margin of the anal fin is very characteristic.

Most of the specimens taken by the s.s. " Pieter Faure " were taken in depths of 46–63 fathoms, though some were taken at 185 fathoms. The " Pickle " specimens, which are presumably this species and not the true *macrops*, were mostly taken from deeper water.

Gen. Porogadus G. and B.

1885. Goode and Bean, Proc. U.S. Nat. Mus., vol. viii, p. 602.

Body considerably compressed, strongly tapering posteriorly, scaly. Head scaly on top and on opercles. Snout not projecting, upper jaw scarcely overlapping lower. Teeth villiform, in bands on jaws, vomer, and palatines. No barbels. Eye moderate. Nostrils separate, posterior one near eye, anterior midway between posterior one and tip of snout. Opercle with one spine, a double row of spines on preopercle, other spines on shoulder, temporal, interorbital, and infraorbital regions and on snout. Pseudobranchiae, if present, small and few. Gill-rakers lanceolate, well developed. Lateral line triple, one dorsal, one median, and one ventral, the median one extending furthest posteriorly. Pectoral without elongated rays. Ventrals close

together, inserted below hind margin of preopercle, each consisting of two rays. Branchiostegals 8. Pyloric caeca almost or completely obsolete.

Porogadus miles G. and B.

1885. Goode and Bean, *loc. cit.*, p. 602.

1895. *Id.*, Ocean. Ichthyol., p. 334, fig. 292.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 107 (references).

Depth 9–10, length of head 6–6½, in length of body. Eye slightly less than interorbital width, 1¾ in snout, 5¾–5⅘ in length of head. Length of head slightly less than distance from base of ventrals to vent. Maxilla extending almost an eye-diameter behind eye. Gill-rakers 21–22 on lower part of anterior arch, the anterior 6–7 being rudimentary and knob-like. Pseudobranchiae 2 filaments. Slit-like mucous pores on infraorbital and lower jaw. Two rows of 4 spines on margin of preopercle, 1 spine on hind angle of ramus of lower jaw, 1 on hind margin of posterior nostril. D commencing above axil of pectoral, which is ⅔ length of head (not " nearly one half," as Gilchrist states), and about equal to length of ventrals, which equals depth of body.

Length.—Up to 255 mm.

Colour.—Uniform blackish-brown.

Locality.—Off Cape Point, 700–800 fathoms.

Distribution.—N. Atlantic, 1168 fathoms.

Gen. Dicrolene G. and B.

1883. Goode and Bean, Bull. Mus. Comp. Zool., vol. x, p. 202.

1889. Alcock, Ann. Mag. Nat. Hist., p. 387 (*Paradicrolene*).

Body moderately compressed, scaly. Whole head scaly. Snout not projecting; jaws about equal in front. Teeth villiform, in bands on jaws, vomer, and palatines. No barbels. Eye moderate. Nostrils close together. Opercle with one spine, preopercle with several. Pseudobranchiae small or absent. Gill-rakers rather long. Lateral line single, obsolete posteriorly. Pectoral with the lower rays separate, elongate, filamentous. Ventrals close together, inserted below hind edge of preopercle, each consisting of two rays. Branchiostegals 8. Pyloric caeca few, rudimentary.

Pteroidonus Gnthr. differs only in having the ventrals farther apart, and each reduced to a single ray.

**Dicrolene intronigra* G. and B.

1883. Goode and Bean, *loc. cit.*, p. 202.

1888. Vaillant, Exp. Sci. Trav. et Talism., p. 258, pl. xxiii, fig. 2.

1890. Alcock, Ann. Mag. Nat. Hist., (6), vol. vi, p. 297 (*Paradicrolene vaillanti*).

1895. Goode and Bean, Ocean. Ichthyol., p. 338, fig. 297, A, B.

1899. Alcock, Cat. Deep-sea Fish. Ind. Mus., p. 85.

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 19.

Depth 6, length of head 5, in length of body. Eye equal to interorbital width, slightly greater than snout, 4–4½ in length of head. Upper jaw rather more than half length of head, maxilla reaching slightly beyond vertical from hind margin of eye. Gill-rakers numerous. Pseudobranchiae 2. A row of large mucous pores from each eye to lateral line. Preopercle with 3 spines. D ca. 100, commencing above base of pectoral. A ca. 85. P 19+7–9, the longest free ray about ⅓ length of body. Ventrals equal in length to postorbital part of head. Lateral line indistinct, about 27 rows of scales between dorsal fin and vent.

Length.—Up to 250 mm.

Colour.—Brownish; gill-membranes, pectorals, ventrals, and margins of dorsal and anal black.

Locality.—Off Cape Point and Table Bay, 226–670 fathoms.

Distribution.—Gulf of Mexico, off north-west coast of Africa, Indian Ocean, 406–983 fathoms.

Gen. Hoplobrotula Gill.

1863. Gill, Proc. Ac. Nat. Sci. Philad., p. 253.

Body compressed, scaly. Head naked, except the opercles and preopercles, which are scaly. Snout not projecting; upper jaw only slightly longer than lower. Teeth villiform, in bands on jaws, vomer, and palatines, and also tongue. No barbels. Eye moderate or rather large. Nostrils moderately close. Opercle with one spine, preopercle with three spines. Pseudobranchiae present, but small. Gill-rakers short. Lateral line single, distinct nearly to tail. Pectoral without elongate rays. Ventrals close together, inserted far forward, below level of eye, each consisting of two rays. Branchiostegals 8. Pyloric caeca well developed, 12–14.

Sirembo, of which *Hoplobrotula* is sometimes regarded as a sub-

genus, differs in having the preopercle unarmed, a single ray only in each ventral, and the head almost entirely scaly.

The forward position of the ventrals gives this genus a strong resemblance to the family *Ophidiidae*.

Hoplobrotula gnathopus Regan.

Natal King Klip-fish.

1921. Regan, Ann. Mag. Nat. Hist., (9), vol. vii, p. 417 (typ. error : *Haplobrotula*).

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 76 (also with error in spelling).

Depth $5\frac{2}{3}$–6, length of head $4\frac{3}{4}$–5, in length of body. Length of head equal to its distance from origin of anal. Eye slightly greater than snout, equal to or slightly greater than interorbital width, $4\frac{1}{3}$–$4\frac{1}{2}$ in length of head. Maxilla extending nearly $\frac{1}{2}$ an eye-diameter behind eye, its posterior width equal to diameter of eye. Lips papillose. Gill-rakers 13–14 on lower part of anterior arch, the 5 posterior fairly long, the anterior ones mere knobs. Pseudobranchiae about 12. Round mucous pores on ramus of lower jaw, on top of head, 1 below eye, 2 below nostrils. D ca. 105, commencing above anterior $\frac{1}{3}$ of pectoral. A ca. 85. P 22, $\frac{2}{3}$ length of head. V $\frac{1}{2}$ length of head, inserted at middle of lower jaw, below anterior $\frac{1}{4}$ or $\frac{1}{3}$ of eye. Lateral line traceable almost to base of caudal fin, 9 scales between lateral line and base of dorsal. Pyloric caeca 14.

Length.—Up to 355 mm.

Colour.—Greyish-brown, with silvery sheen ; dorsal and anal fins blackish posteriorly.

Locality.—Natal coast, 100–260 fathoms.

Type in British Museum ; topotypes in South African Museum.

This species is very closely allied to the Japanese *armata* (Schlegel), from which it appears to differ in the greater number of dorsal and anal rays, and to a lesser extent in the number of gill-rakers and pyloric caeca (see description of *armata* by Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv, 1902, p. 760).

As its name implies, the Natal King Klip-fish bears a strong resemblance to the true King Klip-fish found in Cape waters, but is at once distinguished by the scaling and the short, rounded snout.

Gen. Barathronus G. and B.

1883. Goode and Bean, Bull. Mus. Comp. Zool., vol. xii, p. 164.

Body compressed, naked. Head stout, naked, with muciferous canals. Snout not projecting. Cleft of mouth oblique, lower jaw projecting. Teeth conical, few, on mandible and vomer, none on palatine, teeth on upper jaw rudimentary. No barbels. Eye small, partly on top of head, covered over by, but more or less visible through, the skin. Nostrils close together, small. Maxilla almost entirely concealed under preorbital, expanded posteriorly. Opercle and preopercle without spines. Pseudobranchiae absent. Gill-rakers very numerous, slender, long. Lateral line obsolete. Pectoral without elongate rays. Ventrals inserted below hind margin of preopercle, each consisting of a single ray. Dorsal commencing only slightly in advance of anal. Branchiostegals and pyloric caeca ?

**Barathronus bicolor* G. and B.

1883. Goode and Bean, *loc. cit.*, p. 164.

1895. *Id.*, Ocean. Ichthyol., p. 341, fig. 298.

1906. Gilchrist, Mar. Invest. S. Afr., vol. iv, p. 158.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 107 (references).

Depth $6\frac{1}{3}$, length of head $5\frac{1}{5}$, in length of body. Eye equal to interorbital width, $4\frac{3}{4}$ in length of head. Width of maxilla at posterior end greater than eye. Vomer with 3, each mandible with 5 teeth. D ca. 70. A ca. 57.

Length.—Up to 125 mm.

Colour.—Whitish, with a black band from ventrals to vent, and another stripe above on the side of the belly.

Locality.—Off Cape Point, 660 fathoms.

Distribution.—West Indies, 769 fathoms.

The single specimen procured by the s.s. " Pieter Faure " is no longer in the collection.

Fam. 6. Fierasferidae.

Body elongate, tapering, naked. Mouth not protractile. Lips not strongly developed. No barbels. Teeth cardiform, in jaws, and on vomer and palatines ; canines often present. Dorsal and anal fins confluent, without spines, no caudal fin. Ventral fins absent. Pseudobranchiae absent. Gill-membranes free from isthmus. Gill-openings

wide. Mucous canals of head and lateral line well developed. Pyloric caeca absent (rudimentary). Air-bladder present. Vent at the throat.

A family of small fishes from temperate and tropical seas, remarkable for their habit of living symbiotically with Holothurians (sea-cucumbers), Asteroids (Star-fish), Tunicates, and bivalve molluscs.

They are not parasitic, but seek their food in a normal manner, merely returning to the Holothurian or other animal for protection and seclusion. They seem to be attracted to the Holothurian by the respiratory current and enter it tail first. They are sometimes caught buried in sand or in crevices of coral-reefs.

The eggs are pelagic and are embedded in a mass of slime. The newly-hatched larva has been observed to float in a vertical position, head downwards. It possesses a remarkable elongate filament with foliate expansions, probably a modification of the 1st dorsal ray, which hangs down over the head and is evidently a sensory appendage, perhaps for the purpose of perceiving the respiratory currents of Holothurians, etc., and guiding it to a suitable retreat.

Gen. Fierasfer Cuv.

1810. Rafinesque, Ind. Ittiol. Sicil., p. 57 (*Carapus*, no type specified).

1817. Cuvier, Règne Anim., ed. 2, vol. ii, p. 239.

1837. Thompson, Proc. Zool. Soc. Lond., p. 55 (*Echiodon*).

1843. Lowe, *ibid.*, p. 92 (*Diaphasia*).

1844–48. Richardson, Voy. Erebus and Terror, Fish., p. 74 (*Oxybeles*).

1860. Kaup, Ann. Mag. Nat. Hist., p. 272 (*Porobronchus*, larva).

1864. Gill, Proc. Ac. Nat. Sci. Philad., p. 152 (*Carapus*).

1870. Gasco Bull. Assoc. Nat. Med. Napoli, p. 59 (*Vexillifer*, larva).

1874. Putnam, Proc. Bost. Soc. Nat. Hist., vol. xvi, p. 347 (*Encheliophis*, larva).

1874. Jones, Zoologist., vol. ix, p. 3838 (*Lefroyia*).

1880. Emery, Faun. Flor. Golf. Neapel. Monogr., ii (anatomy, habits, etc.).

1912. Popta, Notes Leyd. Mus., vol. xxxiv, p. 185.

1913. Weber, Siboga Exp. Monogr. 57, p. 95.

With the characters of the family.

The genus is subdivided according as the premaxilla and maxilla are free (*Fierasfer*) or concealed under the skin (*Jordanicus*, Gilb. 1905 *). As this character is not mentioned by all authors and the

* Popta (*loc. cit.*, p. 187) states that *homei* Rich., the type species of *Oxybeles*, has the upper jaw free, so that *Oxybeles* becomes a synonym of *Fierasfer* (sensu stricto), and cannot be used for the second division, as Popta has done.

rather numerous species have not been revised, all the species here mentioned are referred to *Fierasfer*.

Key to the South African species.

1. Teeth in narrow bands in jaws . . . . . *neglectus.*
2. Teeth uniserial in jaws, without canines.
   a. One canine on vomer . . . . . *punctatus.*
   b. Four canines on vomer . . . . . *gracilis.*

**Fierasfer neglectus* Peters.

1855. Peters, Wiegm. Arch., p. 260.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 382.

Length of head 10 in total length. Teeth in jaws and on palatines in narrow bands, the outer series stronger and curved ; 3 very long curved canines on vomer.

Length and colour not stated.

Locality.—Island of Ibo, Mozambique.

**Fierasfer punctatus* Fischer.

1885. Fischer, Jahrb. Hamb. Wiss. Anst., vol. ii, p. 74.

Length of head 8 in total length. Teeth in jaws and on palatines in single rows, without true canines ; a single long canine on vomer.

Length.—236 mm.

Colour.—Yellowish-brown, head and body with numerous small black points and specks.

Locality.—Mozambique, in *Holothuria scabra* var. *tigris*.

**Fierasfer* (*Jordanicus*) *gracilis* Blkr.

1856. Bleeker, Nat. Tyds. Ned. Ind., vol. xi, p. 105.

1862. Günther, Cat. Fish. Brit. Mus., vol. iv, p. 382.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 263.

1926. *Id.*, Ann. Nat. Mus., vol. v, p. 402, text-fig. 2.

Length of head 11 in total length. Upper jaw concealed beneath the skin. Teeth in jaws and on palatines in single rows, without canines ; 4 slightly larger teeth on vomer. (Plate XXXV, fig. 6.)

Length.—Up to 160 mm.

Colour.—Pale mauve, with bluish tinge ; when preserved, drab, with obscure darker mottlings and ocelli ; fins transparent.

Locality.—Natal coast, 120 fathoms.

Distribution.—East Indies.

Fam. 7. Ophidiidae.

Body elongate, more or less tapering behind, usually with very small cycloid scales, or naked ; the scales usually are not imbricated, but embedded in the skin at right angles to one another as in some of the Eels, or in oblique rows. Mouth protractile. Teeth in both jaws, and usually on vomer and palatines, villiform or with larger ones which are usually movable. Dorsal and anal elongate, composed of soft rays, and confluent with caudal. Ventral fins inserted between the rami of lower jaw, each reduced to a pair of rays. Pseudobranchiae present. Gill-membranes separate, narrowly attached to the isthmus behind the ventrals ; gill-openings wide. Lateral line more or less distinct. Air-bladder and pyloric caeca present.

A family of carnivorous fishes, mostly from moderately deep or deep water. (For post-larval stages of *Ophidium* see Fage, 1918, Dan. Ocean. Exp., vol. ii, A 3, p. 148.)

One genus in South Africa.

Gen. Genypterus Phil.

1849. Smith, Ill. Zool. S. Afr. Pisces, pl. xxxi (*Xiphiurus* nom. preocc.)

1857. Philippi, Wiegm. Archiv., p. 268.

1858. Kaup, *ibid.*, p. 93 (*Holophycis*).

1903. Regan, Proc. Zool. Soc., vol. ii, p. 67.

Head scaleless, except on preopercle and opercle. Scales on body not imbricated, arranged in oblique rows (in quincunx). Lateral line distinct. Some of the outer row of teeth in both jaws enlarged, and some of them movable ; vomer and palatines also with some of the teeth enlarged. Opercle ending in a spine concealed under the skin. No spine on tip of snout. Air-bladder (in the Cape species) oblong-ovate, contracted only at the extreme hind end into a small point, without posterior foramen. Pyloric caeca (in the Cape species) 8. Vent antemedian.

An austral genus apparently confined to the southern extremities of South Africa, South America, and Australasia.

Genypterus capensis (Smith).

King Klip-fish ; Koning Klipvis.

1849. Smith, *loc. cit.*, pl. xxxi.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 417 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 152 (references).

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 78.

1923. Von Bonde, *ibid.*, i, p. 35 (*Otophidium c.*).

Depth 8 (adult)–10½ (young, 100 mm.), length of head 4¾–5, in length of body. Eye in young slightly greater than snout, twice the interorbital width, 4 in length of head ; in adult, 2 in snout, equal to or 1⅓ in interorbital width, 8–9 in length of head. The distance from tip of snout to vent is just over twice the length of head, and is 1⅓ (adult)–1½ (young) in distance from vent to caudal fin. Maxilla extending beyond hind margin of eye, its posterior width greater than length of eye. Lips papillose. Gill-rakers 4, together with some rudimentary knobs on lower part of anterior arch. Branchiostegals 7. D commencing above anterior ⅓ or axil of pectoral. Ventrals ⅓ (adult) to nearly ½ (young) length of head. Lateral line distinct nearly to tip of tail ; about 13 series of scales between it and base of dorsal ; bases of dorsal, and to a lesser extent anal, with minute scales. Pyloric caeca 8 (5 on one side, 3 on the other). (Plate XXXV, fig. 5.)

Length.—Up to 1600 mm.

Colour.—Brownish, pinkish-brown, or salmon-coloured, more or less irregularly blotched and marbled ; belly whitish ; whole body, especially in young, with a silvery sheen ; dorsal and anal fins, especially in young, posteriorly black, with a narrow, pure white edge ; iris similar to the surrounding colour.

Locality.—Off west coast (St. Helena and Saldanha Bays), Table Bay, Cape Point, Agulhas Bank, as far east as Algoa Bay, 20–214 fathoms. Regan (1906) describes a specimen said to have come from the Natal coast, but the Marine Survey vessel, s.s. " Pickle," did not find it in this locality.

The Cape species is very close to *blacodes* Bl. Schn. from Australia and New Zealand, and a detailed comparison might possibly prove them to be synonymous. The other Australian species, *microstomus* Regan, appears to be distinguished by the narrower interorbital space and the *broad* white margin to the dorsal and anal fins. Comparisons should, however, be instituted between specimens of the same size, as a very considerable alteration in the relative proportions of the eye, etc., takes place between the young and the adult.

The King Klip-fish grows to a large size at the Cape, viz. up to at least 5 ft. in length, the largest specimens usually being trawled in the deeper waters. It is one of the finest food-fishes of Cape waters.

Group STROMATEOIDEI.

Fam. Stromateidae.

1902. Regan, Ann. Mag. Nat. Hist., (7), vol. x, pp. 115, 194 (revision).
1922. Gilchrist, *ibid.*, (9), vol. ix, p. 249 (oesophageal teeth).

Body deep ovate, oblong or elongate, with moderate or small cycloid, usually deciduous, scales. No bony stay for preopercle. Subocular shelf usually present. Mouth small or moderate, protractile or not. A single series of small pointed teeth in both jaws ; palate toothed or toothless. Nostrils paired. Gill-membranes free from isthmus (with one exception). Gills 4, a slit behind 4th. Pseudobranchiae present, often rudimentary. Dorsal fin with the spinous portion almost or quite forming a separate fin ; or spinous portion may be rudimentary. Anal long, with 3 or more spines. Ventrals, when present, thoracic, of a spine and 5 rays, attached to the belly by membrane and depressible into a more or less well-marked groove. Lateral line single, continuous. Air-bladder present or absent. Pyloric caeca few in number, simple or much branched. Oesophagus with lateral sacs which are toothed internally.

This family, distinguished anatomically by the oesophageal teeth, contains marine pelagic or deep-sea fishes.

Changes in the body shape and length of fins, and other growth-changes frequently occur, the young being deeper in the body, the ventral fins larger, etc.

Key to the South African genera.

I. Ventral fins present in adult.
  A. Lateral line parallel with dorsal profile. Dorsal fin divided.
    1. Teeth on vomer and palatines . . . . . *Nomeus.*
    2. Teeth on vomer and tongue, at least in young . . *Cubiceps.*
    3. Palate toothless . . . . . *Psenes.*
  B. Lateral line straight, but curved anteriorly above the pectorals. Dorsal fin continuous.
    1. Body elongate . . . . . *Centrolophus.*
    2. Body ovate . . . . . *Lirus.*
II. Ventral fins absent in adult . . . . . *Stromateus.*

Gen. Nomeus Cuv.

1817. Cuvier, Règne Anim., ed. 1, vol. ii, p. 315.
1902. Regan, Ann. Mag. Nat. Hist., (7), vol. x, p. 121.

Body oblong, moderately compressed. Scales moderate, deciduous.

Head scaly, except the snout. Mouth small. Maxilla without supplemental bone, entirely concealed under preorbital. Teeth on vomer and palatines. Pseudobranchiae well developed. Dorsal divided. Spinous part with 10–11 slender spines, the middle ones longest, almost separated from soft dorsal. Anal spines 3. Pectorals long. Ventrals well developed, inserted before pectorals in young, below them in adult, large, depressible in a deep furrow. Caudal forked. Lateral line high, parallel with dorsal profile. Air-bladder present.

A single species.

Nomeus gronovii (Gmel.).

Blue-bottle Fish.

1788. Gmelin, Linn. Syst. Nat., vol. xiii, p. 1205.

1850. Cuvier, Règne Anim. Ill. Poiss., pl. lvi, fig. 2 (*maculatus*).

1895. Goode and Bean, Ocean. Ichthyol., p. 220, fig. 227.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 103 (references).

1922. Gilchrist, Ann. Mag. Nat. Hist., (9), vol. ix, p. 253 (oesophageal teeth).

1923. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., iv, p. 6.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 212.

Depth equal to length of head, $3\frac{1}{4}$–$3\frac{2}{3}$ in length of body. Eye $2\frac{1}{2}$–3 in length of head, subequal to interorbital width and about twice length of snout. Gill-rakers 16–18 on lower part of anterior arch. D X–XI I 25–27. A III 25–27. Scales: l.l. 64–66; l.tr. $\frac{4–5}{20–21}$. Below the lateral line a straight groove from suprascapular region to caudal fin.

Length.—Up to 81 mm.

Colour.—Silvery white, top of head indigo-blue; 4–5 black irregular cross-bars, the first through pectoral, the last across caudal peduncle, widest above, narrowing below; one or more round black spots between the lower ends of the cross-bars; spinous dorsal blackish; soft dorsal alternately black and white; 3 brown spots on anal, ventrals black; a black stripe along middle of each caudal lobe.

Locality.—Off Cape Point, False Bay, Natal coast.

Distribution.—Tropical Atlantic and Indo-Pacific Oceans.

This little fish is commonly found associated with the Siphonophores *Physalia* and *Velella*, popularly known as Portuguese Men-of-war and Blue-bottles. It also accompanies jelly-fishes. The stinging tentacles of the *Physalia* may provide a certain amount of protection

to the fish, and the fish is supposed to derive benefit by feeding on the animals which have been stung and disabled by the *Physalia*.

Gen. Cubiceps Lowe.

1843. Lowe, Proc. Zool. Soc. Lond., p. 82.

1849. Smith, Illustr. Zool. S. Afr. Pisces, pl. xxiv (*Atimostoma*).

1902. Regan, Ann. Mag. Nat. Hist., (7), vol. x, p. 122.

1904. Jordan and Snyder, Proc. U.S. Nat. Mus., vol. xxvii, p. 942 (*Ariomma*).

1923. McCulloch, Rec. Austr. Mus., vol. xiv, p. 14.

Similar to *Nomeus*, but ventrals shorter, inserted behind pectorals, breast cultrate, palatine teeth absent, but a patch of teeth on vomer and on tongue, at least in young.

McCulloch doubts the identity of *Ariomma* on account of the presence of adipose eyelids.

Adult specimens of *Cubiceps* appear to be very rare, consequently there is some doubt as to whether the Cape species is really distinct from the Mediterranean and Madeiran species *gracilis*. McCulloch (*loc. cit.*, p. 16) also points out the close relationship between his species *baxteri* and the Cape species.

Key to the South African species.

1. Pectoral a little longer than head. Scales : l.l. 66 . . . *capensis.*
2. Pectoral a little shorter than head. Scales : l.l. 52 . . . *natalensis.*

**Cubiceps capensis* (Smth.).

1849. Smith, *loc. cit.*, pl. xxiv.

1902. Regan, *loc. cit.*, p. 123.

1912. Ariola, Rev. mens. Pesca Pavia, vol. vii, p. 185, pl.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 105.

1922. Gilchrist, Ann. Mag. Nat. Hist., (9), vol. ix, p. 253 (oesophageal teeth).

1923. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., iv, p. 7.

Depth equal to length of head, $3\frac{4}{5}$ in total length. Eye equal to snout, about 4 in length of head. Maxilla not extending to below eye. D XI I 20. A III 20. Pectorals $1\frac{1}{3}$ as long as head. Scales : l.l. 66 ; l.tr. $\frac{6}{22}$.

Length.—1075 mm.

Colour.—Yellowish or chestnut brown above ; preopercle and sides with a purplish tinge ; fins orange- or reddish-brown.

Locality.—Cast up on beach north of Cape Town.

Type (stuffed) in British Museum.

This is the only specimen known, with the exception of a specimen from the Gulf of Genoa, referred to this species by Ariola (*loc. cit.*). I have not been able to consult Ariola's paper, but the locality suggests that either the specimen has been misidentified, or that *capensis* is synonymous with *gracilis*.

Cubiceps natalensis G. and v. B.

1923. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., iv, p. 7, pl. xvii, fig. 2.

Depth equal to length of head, 3–3$\frac{1}{10}$ (figure 3$\frac{1}{3}$) in length of body. Eye greater than snout in young, about equal to it in adult, 3–3$\frac{1}{2}$ in length of head. Maxilla reaching almost or quite to vertical from anterior margin of eye. Gill-rakers 13–14 on lower part of anterior arch. D XI I 20. A III 20. Pectoral slightly less than length of head. Scales : l.l. 52 ; l.tr. $\frac{5}{17}$.

Length.—165 mm.

Colour.—Yellowish, hind margin of opercle and root of pectoral purplish, snout dark brown, spinous dorsal dark brown, pectoral bluish, anal yellowish ; most of the scales with dark centres.

Locality.—Natal coast, 157–275 fathoms.

Type in coll. Govt. Marine Survey.

The shortness of the pectoral fin invites comparison with *brevimanus* Klunz. from the Red Sea, which, however, has only 14–15 rays in the soft dorsal and anal, and l.tr. $\frac{2\frac{1}{2}}{13}$.

A young specimen, 80 mm. long, is in the South African Museum, taken in Durban Bay associated with a jelly-fish.

Gen. Psenes C. and V.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 259.

1902. Regan, Ann. Mag. Nat. Hist., (7), vol. x., p. 124.

Resembling *Cubiceps*, but body ovate and strongly compressed, breast not cultrate, ventral fins inserted below pectorals, and no teeth on tongue or vomer.

Key to the South African species.

1. Dorsal and anal rays 25–27. Scales : l.tr. $\frac{4\text{–}5}{22\text{–}26}$ . . . *cyanophrys.*

2. Dorsal rays 16, anal rays 13. Scales : l.tr. $\frac{4}{14}$ . . . . *indicus.*

Psenes cyanophrys C. and V.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 260, pl. cclxv.

1878–88. Day, Fish. India, p. 237, pl. li, C, fig. 1 (*javanicus*).

1902. Regan, *loc. cit.*, p. 125.

1913. Weber, Siboga Exp. Monogr. 57, p. 152.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 320.

Depth $1\frac{4}{5}$ (young)–$2\frac{1}{5}$, length of head 3–$3\frac{1}{4}$, in length of body. Eye twice length of snout, 3 in length of head (Regan : equal to snout, $3\frac{1}{4}$–$3\frac{4}{5}$ in length of head). D X I 25–27. A III 25–27. Scales : l.l. 52–56 ; l.tr. $\frac{4\text{–}5}{22\text{–}26}$.

Length.—Up to 125 mm.

Colour.—Brownish, with parallel lines of dark dots along the scales ; dorsal, anal, and ventrals dark brown, pectorals yellow or white, caudal yellowish. Young with irregular vertical bands.

Locality.—Natal coast.

Distribution.—Atlantic and Indo-Pacific.

Weber (*loc. cit.*) states that *P. javanicus* Day (*loc. cit.*) does not belong here, owing to its having the lateral line nearly straight. Day seems, however, to have mistaken the line or groove which runs through the middle of the myotomes for the lateral line.

Psenes indicus (Day).

1870. Day, Proc. Zool. Soc. Lond., p. 690.

1878–88. *Id.*, Fish. India, p. 237, pl. liv, fig. 2.

1902. Regan, *loc. cit.*, p. 126.

1922. Gilchrist, Ann. Mag. Nat. Hist., (9), vol. ix, p. 250 (*natalensis* nom. nud.) (oesophageal teeth, fig. 1).

1923. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., iv, p. 8, pl. xviii, fig. 1 (*africanus*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 212.

Depth $2\frac{1}{6}$–$2\frac{1}{4}$, length of head 3–$3\frac{1}{3}$, in length of body. Eye 3–$3\frac{1}{2}$

in length of head, slightly greater than snout, slightly less than interorbital width. Maxilla reaching to below a point midway between posterior nostril and anterior margin of eye, or a little further. Gill-rakers 14–15 on lower part of anterior arch. D X I 14–16. A III (13)14–15 ; 4th and 5th dorsal spines longest, about $\frac{1}{2}$ length of head, or a little less. Pectoral equal to or $1\frac{1}{7}$ as long as length of head. Scales : l.l. 41–45 ; l.tr. $\frac{4}{14}$.

Length.—Up to 200 mm.

Colour (as preserved).—Silvery with a purplish shade dorsally ; in some specimens irregular dark spots and marks on body ; spinous dorsal blackish, especially towards margin ; other fins dusky or light, somewhat yellowish.

Locality.—Mossel Bay, Algoa Bay, Natal and Zululand coasts, 16–55 fathoms.

Distribution.—Indian seas.

Type of *africanus* in South African Museum.

I have examined a considerable number of specimens in the South African Museum, and feel convinced that *africanus* is synonymous with *indicus*.

Von Bonde's drawing gives an entirely erroneous impression of the shape of the profile ; the snout is much less high and the occipital region convex, the profile from dorsal to tip of snout being evenly convex. The scale-count of 50 was obtained apparently by counting the small scales at base of caudal ; the number of pierced scales is 41–45. The figure shows an incorrect number of scales in the transverse count. Thirteen rays in the anal appears unusual.

Regan (1905, J. Bomb. Nat. Hist. Soc., vol. xvi, p. 329, footnote) expresses the opinion that *indicus* is only doubtfully distinct from the Atlantic *regulus* (Poey).

Gen. Centrolophus Lacép.

1802. Lacépède, Hist. Nat. Poiss., vol. iv, p. 441.

1839. Lowe, Proc. Zool. Soc. Lond., p. 81 (*Pompilus*).

1902. Regan, Ann. Mag. Nat. Hist., (7), vol. x, p. 194.

1914. *Id.*, " Terra Nova " Exp., Zool., vol. i, p. 19.

1923. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., iv, p. 2 (*Centrolophodes*).

Body elongate-oblong, moderately compressed. Scales small, somewhat deciduous. Head, except subopercle, interopercle, and

opercle, naked. Mouth moderate. Maxilla slipping under preorbital for its entire length. Vomer and palatine without teeth. Preopercle, sub- and inter-opercles feebly denticulate. Pseudobranchiae present. Dorsal fin continuous. Spines of dorsal and anal slender, resembling simple rays, and passing insensibly into the branched rays. Seven branchiostegals. Caudal forked. Lateral line curved anteriorly; straight posteriorly. Pores over the whole head, and large areas on the body. Air-bladder small.

Five species from moderately deep water: two from the Mediterranean and N. Atlantic, two from Australasian waters, and one (*C. lockingtoni* J. and G.) from California.

Centrolophus niger (Gmel.).

1788. Gmelin, Syst. Nat., p. 1321.

1896. Jordan and Evermann, Fish. N. and Mid. Amer., vol. i, p. 963.

1896. Collett, Res. Sci. Monaco, fasc. 10, p. 26.

1902. Regan, *loc. cit.*, p. 195.

1923. Gilchrist and von Bonde, *loc. cit.*, p. 3, pl. xvii, fig. 1 (*Centrolophodes irvini*).

Depth $3\frac{1}{2}$–4, length of head 4–$4\frac{1}{2}$, in length of body. Eye about $1\frac{1}{3}$ in snout, $4\frac{3}{4}$–5 in length of head. Maxilla reaching to below anterior margin of eye or slightly beyond. Gill-rakers 13–14 on lower part of anterior arch. D 37–42, commencing above middle of pectoral, the length of the rays increasing to about the 13th, thence decreasing to the last. A 20–25. Scales: l.l. 175–205; l.tr. $\frac{23\text{–}30}{55\text{–}70}$. Lateral line becoming straight above the origin of the anal. (Plate XXXIII, fig. 1.)

Length.—Up to 1060 mm.

Colour.—Dark greyish-brown, slightly lighter on the belly, and darker on top of head.

Locality.—Off St. Helena Bay and Saldanha Bay, 85–200 fathoms.

Distribution.—Mediterranean and N. Atlantic, Azores.

Type of *Centrolophodes irvini* in coll. Govt. Marine Survey.

I have seen two specimens of this species from South African waters. Shortly after its capture (1st Dec. 1919) I examined the large specimen later described by Gilchrist and von Bonde as the type of a new genus and species. A cast of this specimen is in the South African Museum.

The second specimen is in the South African Museum, and was caught off Saldanha Bay in 200 fathoms in March 1924. It is 900 mm. in length.

Both specimens agree in all respects and are clearly referable to the N. Atlantic species. The statements of Gilchrist and von Bonde regarding the absence of pseudobranchiae and denticulations on the opercles are incorrect. The pseudobranchiae are small but perfectly distinct, as are likewise the opercular denticulations. The so-called "teeth" on the roof and floor of the mouth are merely minute cutaneous papillae, those on the gill-arches being setiform.

Gilchrist and von Bonde are correct in stating that the pores on the body do not pierce the scales. The scales appear to be naturally deciduous, at least in part, and it is only where a scale has dropped off that a pore seems to be developed. At any rate, no pores could be found in preserved specimens beneath those scales which still adhered to the body, whereas they are very distinct in all the scale-pockets out of which the scales have fallen. Towards the hind end of the body the pores appear to be far less numerous, even where the scales are deciduous, and to be completely absent on the caudal peduncle.

Gen. Lirus Lowe.

1833. Lowe, Proc. Zool. Soc. Lond., p. 143 (*Leirus* non Meg. Coleopt., 1823).

1841. Bonaparte, Icon. Fauna Ital., vol. iii (*Mupus*).

1902. Regan, Ann. Mag. Nat. Hist., (7), vol. x, p. 195 (*Lirus*).

1925. Jordan and Hubbs, Mem. Carn. Mus., vol. x, p. 226 (*Mupus* Cocco).

Body ovate or oblong-ovate, compressed. Scales small. Mouth small or moderate. Maxilla with small supplemental bone, more or less exposed. Head scaly, upper part spongy, porous. Vomer and palatines without teeth. Preopercle generally spinulose, sub- and interopercles denticulate. Pseudobranchiae present. Dorsal fin continuous, with 4–9 spines. Anal spines 3. Caudal forked or emarginate. Lateral line curved anteriorly above pectoral, becoming straight posteriorly.

I have no means of deciding the validity of *Mupus*, and therefore adopt the more generally known generic name.

**Lirus maculatus* (Gnthr.).

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 412 (*Schedophilus m.*).

1866. Kner, SB. Ak. Wiss. Wien, vol. liv, p. 366 (*Schedophilus marmoratus*).

1902. Regan, *loc. cit.*, p. 197.

1923. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., iv, p. 9, pl. xviii, fig. 2.

Depth 2, length of head 3, in length of body. Eye $3\frac{1}{5}$–4 in length of head, equal to or slightly less than interorbital width; snout $\frac{1}{2}$ (young)–$\frac{3}{4}$ eye-diameter. Maxilla reaching to or almost to vertical from centre of eye. D VIII–IX 27–30, spines increasing in length gradually to the soft rays, which decrease in length posteriorly. A III 21–24. Pectoral rounded. Caudal emarginate. Scales: l.l. 100–110; l.tr. $\frac{21–24}{45–56}$.

Length.—Up to 79 mm.

Colour.—Pale yellowish, purplish above, silvery below; top of head and a ring round orbit dark; irregular oval or oblong dark patches on body, extending on to dorsal, anal, and caudal fins; two dark round spots at base of caudal, pectorals and ventrals dark.

Locality.—False Bay.

Distribution.—China, Australia, South Seas.

Only a single specimen of this species has yet been found in South African waters.

Gen. Stromateus Art.

1738. Artedi, Gen. Pisc., p. 19.

1902. Regan, Ann. Mag. Nat. Hist., (7), vol. x, p. 203.

Body ovate, compressed. Scales very small. Mouth small. Maxilla exposed. No teeth on vomer or palatines. Pseudobranchiae present. Opercular bones entire or minutely denticulated. Dorsal fin continuous, with 3–9 feeble, graduated spines. Anal spines 3. Ventrals reduced or even absent in adult, pelvic bones not projecting as a spine. Caudal forked. Lateral line curved anteriorly, becoming straight posteriorly.

Key to the South African species.

1. Caudal lobes much longer than head . . . . . *fiatola.*
2. Caudal lobes equal to length of head . . . . . *microchirus.*

Stromateus fiatola Linn.

Butter-fish; Pampelmoes; Blue-fish; Cape Lady.

1766. Linné, Syst. Nat., ed. 12, vol. i, p. 432.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 373, pl. cclxxii.

1853. Pappe, Synops. Edib. Fish. C.G.H., ed. 1, and 1866, ed. 2, p. 18 (*capensis*).

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 34.

1916. Thompson, Mar. Biol. Rep., vol. iii, p. 104 (references).

1916. Gilchrist, *ibid.*, p. 10, fig. 6 (egg and larva) (as *microchirus*).

1922. *Id.*, Ann. Mag. Nat. Hist., (9), vol. ix, p. 252 (*capensis*; oesophageal tooth, fig. 2).

1922. Norman, *ibid.*, (9), vol. ix, p. 320.

1923. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., iv, p. 11 (*capensis*).

1923. *Id.*, *ibid.*, p. 11 (egg, correction of earlier identification).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 212 (*capensis*).

Depth 2–2$\frac{1}{3}$, length of head 4–4$\frac{1}{3}$, in length of body. Eye 5–8 in length of head, 2–2$\frac{1}{2}$ in snout, slightly less than $\frac{1}{2}$ interorbital width. Maxilla not reaching to below anterior margin of eye. Gill-rakers 10–12 on lower part of anterior arch. D V–VII 38–40, rays increasing in length to about 12th, which is $\frac{3}{5}$–$\frac{3}{4}$ length of head. A III 30–33. Pectoral slightly shorter than or equal to length of head. Ventrals completely absent in adult. Caudal lobes markedly longer than head, about $\frac{4}{5}$ depth of body. Scales: l.l. 100–115, about 25 between l.l. and the scales covering base of dorsal. Cheeks and opercles scaly. (Plate XXXIII, fig. 2.)

Length.—Up to 445 mm.

Colour.—Purplish or bluish above, silvery below; longitudinal rows of round, oval, or oblong spots, which are more or less confluent into stripes below the lateral line, those above the lateral line dark blue with yellow margins, those below yellow; inner surface of pectoral and tips of caudal lobes blackish.

Locality.—Table Bay, False Bay, Agulhas Bank to Natal.

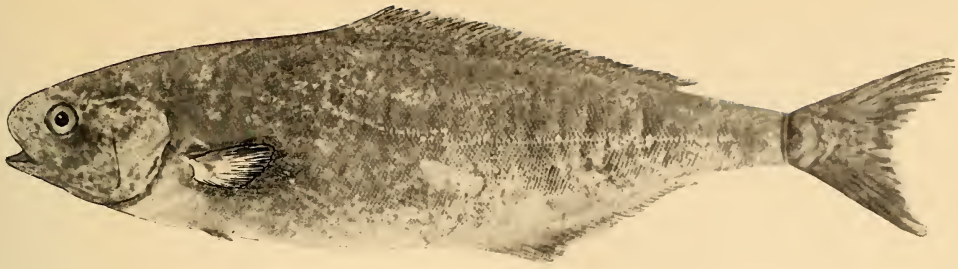
Distribution.—Mediterranean, coast of Mauretania.

Gilchrist and von Bonde retain Pappe's name, and maintain that the Cape form "differs considerably from most of the descriptions of the Mediterranean *fiatola*." They do not, however, state what these differences are. All the specimens I have examined agree with Regan's description and with a Mediterranean specimen. There are no scales on top of the head, but the cheeks and opercles are well covered.

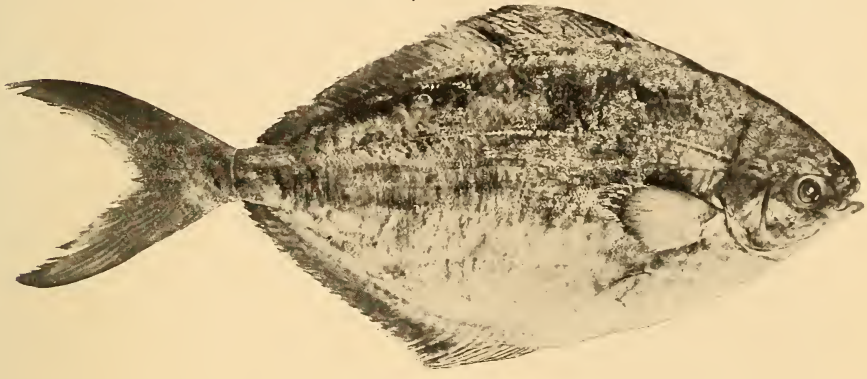
These two authors also state that the Butter-fish is confined to the warmer waters of the south coast, and, on the evidence of fishermen, is never caught in Table Bay. There are, however, several specimens

PLATE XXXIII.

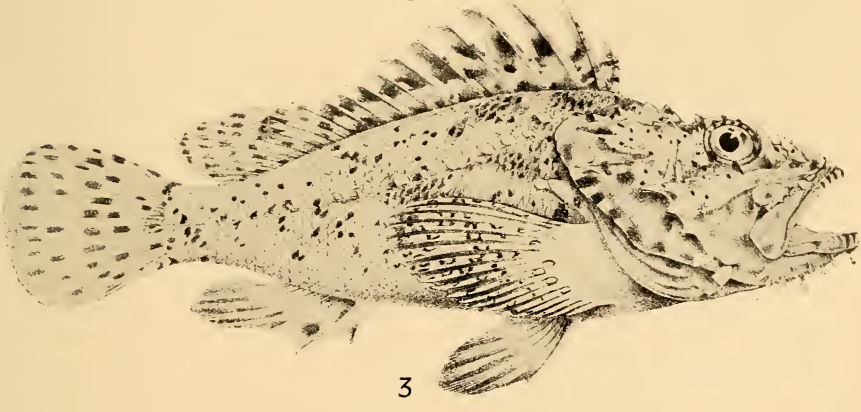
FIG.		TEXT-PAGE
1.	*Centrolophus niger* (Gmel.) (original photo)	895
2.	*Stromateus fiatola* Linn. (original photo)	897
3.	*Scorpaena natalensis* Regan (after Regan)	902
4.	*Choridactylus natalensis* (Gilch.) (after Gilchrist)	922
5.	*Psednos micrurus* n.g. et sp. (original)	927
6.	*Paraliparis australis* Gilch. (after Gilchrist)	927



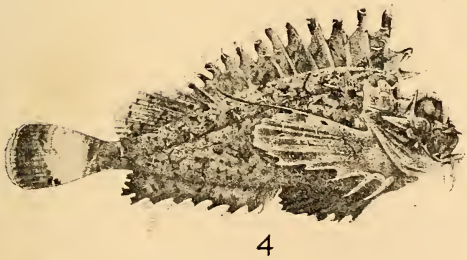
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5



6

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in the South African Museum collected by Dr. Gilchrist and the s.s. " Pieter Faure " in and off Table Bay.

The Butter-fish is highly esteemed food-fish.

Stromateus microchirus (C. and V.).

1819. Bonelli, Mem. Acad. Sc. Torino, vol. iv.

1833. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. ix, p. 416, pl. cclxxvi.

1914. Pellegrin, Ann. Inst. Ocean., vol. vi, p. 34.

1916. Thompson, Mar. Biol. Rep., vol ii, p. 104 (references).

1923. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., iv, p. 11, pl. xix.

Depth 2 or a little less, length of head 3 (juv.)–$3\frac{2}{3}$, in length of body. Eye 4–$5\frac{1}{2}$ in length of head, $1\frac{1}{3}$–$1\frac{1}{2}$ in snout, 2 or a little less in interorbital width. Maxilla extending to below anterior margin of eye. Gill-rakers 10–12 on lower part of anterior arch. D 40–46, spines indistinguishable, rays increasing to about 13th, which is about $\frac{3}{5}$ length of head. A (III) 33–38, spines very feeble. Pectoral about $\frac{3}{4}$ length of head. Ventrals small, but present. Caudal lobes about as long as head. Scales : l.l. ca. 150.

Length.—Up to 140 mm.

Colour.—Greyish, minutely stippled, about 8 or 9 blackish vertical cross-bars, fins dark.

Locality.—False Bay, Mossel Bay, Algoa Bay.

Distribution.—Mediterranean, coast of Mauretania.

This species is easily distinguished by its dark cross-bars. It has been considered to be merely the young of *fiatola*, the length of the caudal lobes being the only real difference between the two, apart from the presence of the ventral fins. This question seems to be still unsettled.

The presence or absence of scales on the cheeks or opercles could not be determined in the South African Museum specimens as they are all bruised.

Group SCLEROPAREI (*Scorpaenoidei*).

Mail-cheeked Fishes.

(1913. Regan, Ann. Mag. Nat. Hist., (8), vol. xi, p. 169, classification.)

The second suborbital produced across the cheek forming a bony

stay for the preopercle. Body scaly, naked, or with bony plates. Tail usually rounded or truncate. Spinous dorsal usually developed. Anal with or without spines. Ventrals thoracic. Pseudobranchiae usually present.

The Mail-cheeked Fishes are at once distinguished by the character from which they derive their name. They form a very natural group, and though differing widely in shape and other characters, possess a general facies which renders them easily recognised. The head generally has various bony knobs and prominences and is often heavily armoured.

Fishes of moderate or small size, mostly inhabitants of shallow water, and often brightly coloured.

Key to the South African families.

I. Head not completely cuirassed.
  A. Ventrals narrowly separated.
    1. Nostrils double.
      a. Ventrals present, not united.
        i. Anal fin with spines.
          α. Gill-membranes free from isthmus *Scorpaenidae.*
          β. Gill-membranes united with isthmus *Synanciidae.*
        ii. No anal spines . . . . . *Cottidae.*
      b. Ventrals absent, or, if present, united to form a sucking disc *Liparidae.*
    2. Nostrils single . . . . . *Congiopodidae.*
  B. Ventrals moderately or widely separated.
    1. Scaly. Ventrals below or behind bases of pectorals *Platycephalidae.*
    2. Naked, except for a row of bony scutes on each side. Ventrals in front of bases of pectorals . . . . *Hoplichthyidae.*
II. Head completely cuirassed.
  A. Ventrals widely separated . . . . . *Triglidae.*
  B. Ventrals narrowly separated . . . . . *Dactylopteridae.*

Fam. 1. Scorpaenidae.

Body moderately elongate, scaly or naked. Head not completely cuirassed, usually with spines. Two nostrils on each side. Gill-membranes free from isthmus. Pseudobranchiae present. Three pairs of dentigerous upper pharyngeals. Spinous dorsal longer than soft. Anal with 1–3 spines, usually strong and pungent. Pectorals large. Ventrals close together, with 1 spine and 3–5 rays.

This family contains a large number of marine fishes, carnivorous

in habits, and ranging over the whole world, some descending to considerable depths. Bright coloration and mimetic resemblance to surrounding objects are of common occurrence.

Some of the species are viviparous, the young being very small and numerous. In these species a genital papilla is developed as an intromittent organ in the male.

Key to the South African genera.

I. Scales distinct.
  A. Pectoral with lowest ray not detached.
    1. Dorsal spines not greatly elongated.
      a. Dorsal spines XII.
        i. Scales on head absent, or, if present, cycloid and concealed in skin. Pectoral rounded.
          α. Palatine teeth present . . . *Scorpaena.*
          β. Palatine teeth absent . . . *Scorpaenopsis.*
        ii. Scales on head ctenoid. Pectoral square *Helicolenus.*
      b. Dorsal spines XIII. Scales on head ctenoid.
        i. Suborbital stay not prominent, smooth *Sebastichthys.*
        ii. Suborbital stay with strong hooked spines *Sebastosemus.*
    2. Dorsal spines greatly elongated . . . . . *Pterois.*
  B. Lowest pectoral ray detached . . . . . *Apistus.*
II. Scales rudimentary or absent.
  A. Second to fourth dorsal spines elevated, forming a crest *Amblyapistus.*
  B. Anterior dorsal spines not elevated.
    1. Anal spines I or II. Soft rays simple . . . *Coccotropus.*
    2. Anal spines III. Soft rays apically branched . *Coccotropsis.*

Gen. Scorpaena (Artedi) Linn.

1738. Artedi, Gen. Pisc., p. 47.

1758. Linné, Syst. Nat., ed. 10, p. 266.

1918. Fage, Dan. Ocean. Exp., vol. ii, A 3, p. 101 (post-larval stages).

Body oblong, somewhat compressed. Scales ctenoid, often with skinny flaps. Head large, not cuirassed, with spinous ridges and often dermal flaps, either naked or with cycloid scales embedded in the skin. A groove on the occiput. Teeth in villiform bands on jaws, vomer, and palatine. Two spines on preorbital projecting downwards over maxilla. Dorsal fin with 12 stout spines. Anal with 3. Pectorals large, rounded. Ventrals arising behind bases of pectorals. Caudal rounded or subtruncate. Air-bladder absent.

Numerous species in tropical and subtropical seas. The name Scorpion-fish has been given to them in allusion to the sting-like wound inflicted by the dorsal spines.

Key to the South African species.

1. Pectoral with 8 or more branched rays . . . . . *natalensis.*
2. Pectoral with less than 8 branched rays.
   a. Pectoral with 5 branched and 12 simple rays. Caudal fin banded *haplodactylus.*
   b. Pectoral with 4 branched and 11 simple rays. Caudal fin not banded *mossambicus.*

Scorpaena natalensis Regan.

Natal Scorpion-fish.

1906. Regan, Ann. Nat. Govt. Mus., vol. i, pt. 1, p. 5, pl. v.

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 3, p. 236.

1909. *Id.*, *ibid.*, p. 237 (*scrofa* non Linn.).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 408.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 253 (*durbanensis* non G. and T.).

Depth $2\frac{4}{5}$–3, length of head $2\frac{1}{2}$–$2\frac{3}{5}$, in length of body. Eye 5 in length of head, equal to or a little less than interorbital width. Maxilla reaching to level of middle of eye. Band of vomerine and palatine teeth in a sinuous curve. Head naked, with skinny flaps, but without conspicuous supraorbital tentacle flaps along lateral line. Interorbital space concave, with 2 weak ridges ending in spines. A pair of nasal spines, 3 supraorbital spines, 2 occipital and 2 temporal spines, suborbital ridge with 3 spines leading to a double preopercular spine, with 3 spines below. Gill-rakers 9 on lower part of anterior arch, knob-like. D XII 10, 3rd and 4th spines longest. A III 5, 2nd and 3rd spines about equal. Pectoral with 9–10 branched, and 10 simple rays. Scales: l.l. 45–48; l.tr. $\frac{5}{24\text{–}26}$; lat. line tubules 23–26. (Plate XXXIII, fig. 3.)

Length.—Up to 300 mm.

Colour.—Reddish, spotted and marbled with blackish, but without definite bands on caudal pectoral or elsewhere; often a dark blotch between 6th and 9th (or 7th–9th) dorsal spines.

Locality.—False Bay to Natal, 20–40 fathoms.

Type in British Museum.

Regan does not vouchsafe in what points *natalensis* differs from *scrofa* Linn., which ranges from the Mediterranean to Madeira, the Azores, and W. Africa. The two specimens reported upon by Gilchrist and Thompson are really conspecific, the differences in the size of the eye and other features being negligible and inconstant, and I have here referred them to *natalensis*.

**Scorpaena haplodactylus* Blkr.

Bar-tailed Scorpion-fish.

1852. Bleeker, Nat. Tyds. Ned. Ind., vol. iii, p. 698.

1878–88. Day, Fish. India, p. 149, pl. xxxvi, fig. 2.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 408.

Depth 3, length of head $2\frac{1}{2}$, in length of body. Eye 4 in length of head, twice the interorbital space which is deeply concave. No groove below eye. Maxilla reaching to below centre of eye. Vomerine teeth in a narrow ∧-shaped band, a few teeth on anterior end of palatine. Head with the cheeks and upper part of opercles scaly. Orbital tentacle moderate; skinny flaps along lateral line, and on head. A pair of nasal spines, 3 supraorbital, 3 occipital, and 3 temporal spines; suborbital ridge spinate, 5 preopercular spines. D XII 9, 4th spine longest. A III 5, 2nd spine the strongest. Pectoral with 5 branched and 12 simple rays. Scales: l.l. 42; l.tr. $\frac{6}{22}$; lat. line tubules 26.

Length.—Up to 110 mm.

Colour.—Brownish-black, banded and marbled; fins mottled, dorsal with irregular bands, anal with a broad black band, pectoral more or less definitely banded; caudal with a black band at base and another across middle, margin black, with pale edge.

Locality.—Coast of Natal and Zululand.

Distribution.—Indo-Pacific.

**Scorpaena mossambica* Peters.

1855. Peters, Wiegm. Archiv., p. 241.

1891. Sauvage, Poiss. de Madagascar, p. 295, pl. xxxiii, figs. 1, 1*a*.

Depth $2\frac{1}{2}$, length of head $2\frac{1}{3}$, in length of body. Eye equal to snout, $3\frac{1}{2}$ in head. Interorbital space without ridges. A pair of nasal spines, 3 supraorbital spines. Occipital, temporal, and suborbital spines. Maxilla reaching to level of hind margin of eye. Vomerine teeth in an open ∧-shaped band; palatine band short and narrow. Supraorbital tentacle long, fringed. D XII 9, 4th spine longest. A III 5, 2nd spine strongest. Pectoral with 4 branched and 11 simple rays. Scales: lat. line tubules 30.

Length.—Up to 95 mm.

Colour.—Reddish, marbled with black, 3 irregular blackish bands

on anal, 3 narrow and less well-marked ones on pectoral ; axil greyish, with an indistinct yellowish blotch.

Locality.—Mozambique.

Gen. Scorpaenopsis Heck.

1840. Heckel, Ann. Wien. Mus., vol. ii, p. 159.

1904. Jordan and Starks, Proc. U.S. Nat. Mus., vol. xxvii, p. 136.

Similar to *Scorpaena*, but without palatine teeth and with only one preorbital spine projecting downwards over maxilla.

Key to the South African species.

1. A large supraorbital fleshy tentacle . . . . . *rosea.*
2. Supraorbital tentacle absent or quite small.
   - *a.* Eye equal to or greater than interorbital width . . . *cirrhosa.*
   - *b.* Eye less than interorbital width . . . . . *gibbosa.*

Scorpaenopsis rosea (Day).

Roseate Scorpion-fish.

1867. Day, Proc. Zool. Soc. Lond., p. 703.

1878–88. *Id.*, Fish. India, p. 151, pl. xxxvi, fig. 4.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 408.

Depth $2\frac{3}{5}$–$2\frac{4}{5}$, length of head $2\frac{1}{2}$–$2\frac{3}{5}$, in length of body. Eye 4–$4\frac{1}{2}$ in length of head, $1\frac{1}{2}$ in snout. Interorbital space $\frac{3}{4}$ diameter of eye, deeply concave, with 2 ridges. A groove below eye, not confluent with its fellow in front of eye. Maxilla reaching to level of centre of eye. A pair of sharp nasal spines, 2 supraorbital, 5 suborbital spines, 1 preorbital spine projecting down over maxilla. Occipital and temporal ridges each with 3 spines. A large fleshy fimbriate tentacle above eye, and several others on snout, angle of mouth and lower jaw, and lateral line. Head naked except for a few scales on upper part of opercle. D XII 9–10, 3rd spine longest. A III 5, 2nd spine stronger but not longer than 3rd. Pectoral with 5–6 branched and 11–12 simple rays. Gill-rakers 10–11, on lower part of anterior arch, short, rod-like. Scales : l.l. 40–43 ; l.tr. $\frac{6\text{–}8}{15\text{–}18}$; lat. line tubes 23–24.

Length.—Up to 120 mm.

Colour.—Rosy, marbled with greyish, fins more or less banded, one or two irregular vertical stripes across caudal.

Locality.—Natal and Zululand coast.

Distribution.—Indian seas.

Scorpaenopsis cirrosa (Thunb.).

Bearded Scorpion-fish.

1793. Thunberg, Nya Handl. Stockh., vol. xiv, p. 199, pl. vii, fig. 2.

1873–75. Günther, Fische d. Südsee, vol. i, p. 78, pl. 54.

1877. Bleeker, Atlas Ichthyol., vol. ix, pl. cdxiii, fig. 6.

1891. Sauvage, Poiss. Madagascar, p. 299.

1904. Jordan and Starks, Proc. U.S. Nat. Mus., vol. xxvii, p. 136.

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 3, p. 236 (*durbanensis*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, pp. 407 (*durbanensis*) and 409 (references).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 30, pl. vii (*marmoratus*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 253.

Depth 3–3½, length of head 2⅖–2½, in length of body. Eye 6 in length of head, 1⅔–2 in snout. Interorbital space less than (young) or equal to (adult) diameter of eye, with 2 well-marked ridges, not ending in spines. A shallow groove below eye, ending in front in a more or less deep pit. Maxilla reaching level of hind margin of eye. Occipital groove shallow. A pair of nasal spines, 3 supraorbital with an additional spine behind, 2 occipital, 3 temporal, 4 suborbital ending in a double spine. Upper parts of preopercle and opercle more or less scaly. Supraorbital tentacle small or none. Fleshy fimbriate tentacles on snout, angle of jaw, lower jaw, and lateral line. D XII 9–10, 3rd–5th spines longest. A III 5, 2nd spine strongest. Pectoral not reaching origin of anal, with 5–7 branched and 11 simple rays. Gill-rakers 10–12 on lower part of anterior arch, knob-like. Scales : l.l. 52–58 ; l.tr. $\frac{7}{20}$; lat. line tubules 23–26.

Length.—Up to 300 mm.

Colour.—Reddish or yellowish, mottled with brown ; belly and gill-membranes scarlet or orange ; fins mottled with dark, more or less wavy, bands ; axil of pectoral light with brownish ocellate blotches.

Locality.—Natal coast.

Distribution.—Indo-Pacific to Japan and Hawaiian Islands.

Type of *durbanensis* in South African Museum.

S. durbanensis was originally described as a *Scorpaena*, but there are no palatine teeth, and I have but little hesitation in identifying it with *cirrhosa*. Both the type and other specimens, however, have a very shallow suborbital groove, which is continued round in front to join its fellow, without the deep pit mentioned by Günther (1873–75). Jordan and Starks (1904) make no mention of this pit.

Scorpaenopsis gibbosa (Bl. Schn.).

Hunchback Scorpion-fish.

1801. Bloch-Schneider, Syst. Ichthyol., p. 192, pl. xliv.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 312 (*diabolus*).

1829. *Id.*, *ibid.*, p. 315 (*nesogallica*).

1844. Richardson, Ichthyol. Voy. Sulph., p. 76, pl. xl.

1873. Sauvage, Nouv. Arch. Mus., vol. ix, p. 50, pl. vii, fig. 3.

1873–75. Günther, Fische d. Südsee, vol. i, p. 79, pl. liii.

1877. Bleeker, Atlas Ichthyol., vol. ix, pl. cdxi, fig. v, and pl. cdxvi. fig. 4.

1891. Sauvage, Poiss. Madagascar, p. 297 (references).

1917. Regan, Ann. Durban Mus., vol. i, pt. 5, p. 459.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 254.

Depth $2\frac{1}{2}$–$2\frac{2}{3}$, length of head $2\frac{1}{4}$–$2\frac{1}{3}$, in length of body. Eye $5\frac{1}{2}$–$6\frac{1}{2}$ in length of head, $1\frac{1}{2}$–2 in snout and in the interorbital space, which has 2 feeble ridges. Occipital groove moderate. A groove below eye ending in front in a deep pit. Maxilla reaching level of hind margin of eye. A pair of nasal spines, 3 supraorbital, 3 occipital, 3 temporal spines, 4 preopercular spines, the last one double. Supraorbital tentacle short or none; fleshy tentacles on jaws and lateral line. Upper parts of opercle and preopercle scaly. D XII 9–10, the spines rather short, strong, and curved, 3rd and 4th longest. A III 5, 2nd spine strongest. Pectoral large, reaching origin of anal, with 5–6 branched and 10–12 simple rays. Gill-rakers 9 on lower part of anterior arch, knob-like. Scales: l.l. ca. 40; l.tr. $\frac{7\text{–}8}{20\text{–}23}$; lat. line tubules 22–24.

Length.—Up to 230 mm.

Colour.—Very variable; reddish, mottled with grey or brown,

fins marbled ; a dark band on anal ; pectoral with a dark band at base and another near margin, both indicated on inner surface of fin ; ventrals black with pale margin ; caudal with dark band at base and another across centre, margin pale ; axil of pectoral pale with dark spots.

Locality.—Natal coast.

Distribution.—East Indies, China, South Pacific.

Gen. Helicolenus G. and B.

1895. Goode and Bean, Ocean. Ichthyol., p. 248.

Body oblong, somewhat compressed. Scales ctenoid on body and head, no dermal flaps. Head large, not cuirassed, with moderately developed ridges and spines. Suborbital stay without prominent ridge or spines. No groove or occiput. Interorbital space narrow, concave. Teeth in villiform bands on jaws, vomer, and palatine. Dorsal fin with 12 spines, anal with 3. Pectoral truncate, uppermost 2 and lower 8 rays simple, the middle ones branched ; the lower ones with their tips free from membrane for about $\frac{1}{2}$ their length. Ventrals arising just behind bases of pectorals. Caudal truncate or slightly emarginate. Air-bladder absent. Gill-rakers moderate (not exceeding $\frac{1}{2}$ diameter of eye), genital papilla present in male. Viviparous.

This genus is characterised by the square-cut pectoral fin. It is closely allied to *Scorpaena*, but has a *Sebastes*-like head. Atlantic, Australia, and South Africa.

Helicolenus maculatus (C. and V.).

Sancord.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 343.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 136.

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 75.

Depth 3, length of head $2\frac{2}{3}$, in length of body. Eye 3 in length of head. Snout $\frac{2}{3}$, interorbital width $\frac{1}{2}$, diameter of eye. Interorbital space with 2 grooves, naked. Maxilla reaching to below hind margin of eye. Arrangement of spines as in *Sebastichthys capensis*. A small knob at symphysis of lower jaw. Gill-rakers 20–22 on lower part of anterior arch, $\frac{2}{5}$ diameter of eye in length. D XII 13, 3rd and 4th spines longest, $\frac{2}{5}$ length of head. A III 5, 2nd spine stronger, but not longer than 3rd. P 19–20. Caudal truncate. Scales : l.l. about

60; lat. line tubules about 30. Jaws and spinous dorsal naked, but sometimes a few scales on hind end of maxilla.

Length.—Up to 350 mm.

Colour.—Reddish, mottled on back with brown, a brown spot at base of each dorsal spine; lining of body cavity and gill-cover black.

Locality.—False Bay, Agulhas Bank to Natal, 50–300 fathoms.

Closely allied to the Atlantic species *H. dactylopterus* and *maderensis*, differing mainly in the coloration.

Gen. Sebastichthys Gill.

1862. Gill, Proc. Ac. Sci. Philad., p. 329.

Body oblong, somewhat compressed. Scales ctenoid on body and on head; usually with numerous small accessory scales; no dermal flaps. Head large, not cuirassed, with moderately developed ridges and spines. Suborbital stay without prominent ridge or spines. No groove on occiput. Interorbital space narrow (at least 5 in length of head) and concave. Teeth in villiform bands on jaws, vomer, and palatine. Dorsal fin with 13 (rarely 14) spines, anal with 3. Pectoral rounded. Ventrals arising below bases of pectorals. Caudal subtruncate or slightly emarginate. Air-bladder present. Gill-rakers short and thick. Genital papilla present in male. Viviparous.

This genus is closely allied to *Sebastodes*, but differs in the short gill-rakers and narrow concave interorbital space. The species are found in Japan and on the Pacific coasts of N. and S. America, as well as in South Africa.

Sebastichthys capensis (Gmel.).

Jacob Evertson; Jacopever.

1788. Gmelin, Syst. Nat., vol. iii, p. 1219.

1849. Smith, Ill. Zool. S. Afr. Pisces, pl. xxii, figs. 1 and 2.

1898. Jordan and Evermann, Fish. N. Amer., vol. ii, p. 1833.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 135 (references).

Depth 3, length of head $2\frac{1}{2}$, in length of body. Eye 4–$4\frac{1}{4}$ in length of head, subequal to snout. Interorbital space $\frac{3}{3}$ diameter of eye, concave, with 2 ridges, scaly (not naked as Sauvage says). Maxilla reaching to below centre of eye. A pair of nasal spines. Supraorbital ridge with 1 anterior and 3 posterior spines. A pair of occipital ridges, each ending posteriorly in a spine. Two flat spines just above opercle, 2 on angle of opercle, 5 conical spines on margin of preopercle. A knob at symphysis of lower jaw. Gill-rakers 20–22 on lower part of anterior

arch, not exceeding $\frac{1}{4}$ diameter of eye in length. D XIII 13–14, 3rd and 4th spines longest, 3–3½ in length of head. A III 6, 2nd spine strongest, about equal to longest dorsal spine. P 18, the lower 9–10 rays simple. Caudal truncate. Scales: l.l. 60–70; lat. line tubules 36–40. Numerous small accessory scales mixed in with the larger ones on the body. Bases of vertical fins minutely scaly. Jaws naked.

Length.—Up to 400 mm.

Colour.—Red, shading to orange below; several silvery-white or pinkish irregular spots on sides above the lateral line; fins red, membrane of spinous dorsal mottled with brown; iris golden.

Locality.—Off Table Bay, and Saldanha Bay 40–150 fathoms.

Distribution.—S. Atlantic, Gough Island (Regan), Tristan d'Acunha (South African Museum).

Gen. Sebastosemus Gill.

1905. Gill, Proc. U.S. Nat. Mus., vol. xxviii, p. 220.

Body oblong, somewhat compressed. Scales ctenoid on head and body, no accessory scales; dermal filaments typically absent, but sometimes developed. Head large, not cuirassed, with prominent ridges and spines. Suborbital stay with a prominent ridge bearing recurved spines, and ending in a large spine on preopercle. No groove on occiput. Interorbital space narrow, concave. Teeth in villiform bands on jaws, vomer, and palatine. Dorsal fin with 13 spines, anal with 3. Pectoral rounded, the uppermost ray and the lower 6–9 simple, the middle ones branched. Ventrals arising below bases of pectorals. Caudal subtruncate. Air-bladder (in the Cape species) absent. Gill-rakers moderate.

The type species is *S. entaxis* (J. and S.) from Japan.

The single Cape species seems closely allied to the N. Atlantic *Scorpaena echinata* Koehler. Neither of the two belong to *Scorpaena*, but there is considerable difficulty in placing them in their correct genus.

The genera *Sebastiscus*, *Thysanichthys*, and *Sebastosemus* seem to be distinguished from each other on very slender grounds. *Sebastiscus* has D XII and lacks the strong spinose suborbital stay, but on the other hand has dermal filaments on the head. *Thysanichthys* has filaments on the body as well as the head, D XIII, and a strong spinose suborbital. *Sebastosemus* has no dermal filaments, D XIII, and in other respects is very similar to *Thysanichthys*.

Another genus, *Neobastes*, as defined by the Australian ichthyo-

logists, McCulloch and Waite, also comprises forms without dermal filaments, D XIII, and a more or less strongly spinose suborbital. It may be doubted whether all the Australian species are congeneric.

All the above-mentioned genera are admittedly closely related to *Sebastodes*, and should perhaps only be regarded as subgenera of the latter genus.

Scorpaena echinata Koehler has D XII, dermal filaments on head and body, and a strong spinose suborbital. The Cape species agrees as regards the last feature, but has dermal filaments only on the head, and (at least in the adult) D XIII.

On the whole it seems best to put *S. capensis* into the genus *Sebastosemus*. Whether or not the definition of the genus is enlarged to include *S. echinata*, the close resemblance of the northern and southern Atlantic species should be borne in mind.

Sebastosemus capensis (G. and v. B.).

Spiny Jacopever.

1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., vii, p. 18 (*Scorpaena c.*).

Depth 3–3¼, length of head 2⅓, in length of body. Eye 3½–3¾ in length of head. Snout 1¼–1½ in eye. Interorbital space concave, without ridges (or very weak ones), more or less scaly, 2¾–3¼ in eye. Maxilla reaching to below posterior third of eye. A pair of nasal spines. Supraorbital ridge with 1 anterior and 2 posterior spines, 2 occipital spines; 3 spines in line between eye and lateral line. Suborbital stay with 3 anterior and 3 posterior curved spines, and ending in the double spine on preopercle, below which are 4 spines; 3 blunt preorbital and a pair of opercular spines. Usually a fleshy filamentous tentacle behind the supraorbital, suborbital, and occipital spines. Gill-rakers 10–12 on lower part of anterior arch; the longest ½ pupil of eye, club-shaped and apically spinulose; the lowermost ones rudimentary. D XIII 9, 3rd–5th spines longest, not quite 3 in length of head. A III 5, 2nd spine longer and stronger than 3rd, slightly longer than longest dorsal. P 20–23, the upper one and the lower 7–9 simple. Caudal subtruncate. Scales: l.l. about 60; l.tr. $\frac{7}{18–20}$; lat. line tubules 28–31. Opercle, preopercle, and maxilla scaly. No air-bladder.

Length.—Up to 270 mm.

Colour (as preserved).—Pale yellowish-white, with faint indications

of darker mottling on back and spinous dorsal; lining of body and gill-cavities blackish.

Locality.—Off Cape Point, Table Bay, and St. Helena Bay, 280–560 fathoms.

Type in coll. Govt. Marine Survey.

There are some small specimens (up to 80 mm.) in the South African Museum from off Buffalo River, East London, 300 fathoms, which I have compared with large specimens of the above species. There appear to be no differences between them except that the small specimens all have only 12 dorsal spines, and 2 or 3 preopercular spines below the double one. It is probable that these are young examples of *Sebastosemus capensis*.

Gen. Pterois Cuv.

1817. Cuvier, Règne Anim., ed. 1, p. 286.

Body oblong, somewhat compressed. Scales moderate or small, usually not ctenoid. Head not cuirassed, with more or less spinose ridges and fleshy tentacles. Teeth in villiform bands on jaws and vomer, none on palatine. Dorsal fin elevated, with 12–13 long, slender, sharp spines, joined by membrane at base only, soft dorsal also rather high, rays branched. Anal with 2–3 slender spines and 6–8 branched rays. Pectoral greatly elongate, all the rays simple, and for the most part not connected by membrane, tips reaching to or beyond the caudal. Ventral moderate or long. Caudal rounded or truncate. Air-bladder large.

Moderate-sized fishes of striking and vivid coloration, and widely distributed in the tropical and subtropical waters of the Indo-Pacific Ocean. They are shallow-water inhabitants and are particularly abundant on coral-reefs.

The dorsal spines are provided with poison glands and frequently inflict painful wounds if the fishes are not handled with great care.

Key to the South African species.

1. Pectoral rays simple, very long (*Pterois*).
   - *a.* Scales small, cycloid, l.r. 70–90.
     - i. Caudal fin spotted . . . . . *volitans.*
     - ii. Caudal fin unspotted . . . . . *kodipungi.*
   - *b.* Scales moderate, feebly ctenoid, l.r. 40–46 . . . . *macrurus.*
2. Pectoral rays branched, not very long, membrane extending almost to tips (*Dendrochirus*).
   - *a.* Scales: l.r. 42–45 . . . . . *brachyptera.*
   - *b.* Scales: l.r. 50–55 . . . . . *zebra.*

Pterois volitans (Linn.).

Butterfly-fish.

1758. Linné, Syst. Nat., ed. 10, p. 296.

1877. Bleeker, Atl. Ichthyol., vol. ix, pl. cdxii, fig. 3.

1878–88. Day, Fish. India, pp. 153, 154, pl. xxxvii, figs. 1 and 2 (*miles* and *volitans*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 409 (*miles* and *volitans*) (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 136 (references).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 31 (references).

Depth about equal to length of head, 3 or a little less in length of body. Eye equal to interorbital width, 4½–5 in length of head. Maxilla reaching to level of anterior third of eye. Interorbital space deeply concave, with 2 low ridges which are continued backwards into the strong nuchal crests. Supraorbital ridge with a small anterior and a stronger posterior spine. A pair of nasal spines. Two ridge-like temporal spines. Preorbital with radiating spinose ridges, which are continued across cheek to preopercle, which has 3–4 spines on its margin. Opercular spine feeble. Fleshy tentacles on head, one above eye and one overhanging maxilla being the largest. D XIII 10–12, longest spines greater than depth of body. A III 6–7, 3rd spine longest, nearly ½ length of head. P 13–14, reaching to or beyond caudal fin. V I 5, reaching to or slightly beyond origin of anal. Scales small, cycloid : l.r. 90–92 ; l.tr. (between dorsal and lat. line) 12–13. Cheeks and opercles scaly, interorbital either scaly (*miles*) or more or less naked (*volitans*).

Length.—Up to 300 mm.

Colour.—Reddish ; head and body with numerous dark cross-bands ; spinous dorsal banded ; soft dorsal, anal, and caudal with black spots ; ventrals dark, with white or yellowish spots near base ; pectoral banded, a white spot in the axil ; eye with radiating dark streaks.

Locality.—Algoa Bay to Natal, Zululand, Portuguese East Africa.

Distribution.—Indo-Pacific.

P. miles Benn. (=*muricata* C. and V.) does not seem to be distinguished by any constant characters. The development of the scales on the interorbital space and the length of the supraorbital tentacle and of the pectoral fins are eminently variable features.

Pterois kodipungi (Russell).

Plain-tailed Butterfly-fish.

1803. Russell, Fish. Vizag., vol. ii, p. 25, pl. cxxxiii.

1831. Bennett, Proc. Zool. Soc., p. 128 (*russellii*).

1877. Bleeker, Atl. Ichthyol., vol. ix, pl. cdxv, fig. 5.

1878–88. Day, Fish. India, p. 152, pl. xxxvi, fig. 5 (*russellii*).

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 175 (*miles*).

Very similar to *volitans*, but with A III 7–8, and slightly larger scales : l.r. 70 ; l.tr. (between dorsal and lat. line) 10–11. The colour pattern is also different.

Length.—Up to 300 mm.

Colour.—Reddish, with numerous dark cross-bands ; spinous dorsal banded or annulated with white ; soft dorsal, anal, and caudal unspotted ; ventrals dark, with whitish spots over nearly the whole fin ; pectoral greyish, more (adult) or less completely covered with dark spots, no white spot in axil.

Locality.—Natal coast.

Distribution.—Indian and E. Indian seas, Australia.

Pterois macrurus Alck.

Black-finned Butterfly-fish.

1896. Alcock, J. Asiat. Soc. Beng., vol. lxv, pt. 2, p. 303.

1898. *Id.*, Illustr. Zool. Investig. Fishes, pl. xviii, fig. 4.

1899. *Id.*, Cat. Deep-sea Fish. Ind. Mus., p. 30.

1904. Gilchrist, Mar. Invest. S. Afr., vol. iii, pt. 2, pl. xx (*nigripinnis*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 409 (*nigripinnis*).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 32, pl. viii (*natalensis*).

Depth 3, length of head, $2\frac{2}{3}$ ($2\frac{1}{2}$–$2\frac{4}{5}$), in depth of body. Eye subequal to snout, $3\frac{1}{2}$ in length of head. Interorbital $\frac{1}{2}$–$\frac{2}{3}$ diameter of eye. Maxilla reaching to below front margin of eye. A pair of nasal spines. Supraorbital, nuchal, temporal, preorbital, and cheek ridges serrulate, Three spines on margin of preopercle. A large fleshy tentacle over eye and another overhanging maxilla. D XIII 9 (Gilchrist's figure is wrong) ; 1st spine arising between the nuchal ridges, at a distance from eye less than the eye-diameter. A II 7. P 19–20, reaching to

base of caudal. V I 5, reaching slightly beyond origin of anal. Caudal rounded or pointed, one at least of the uppermost rays produced as a slender filament (in adult). Scales moderate, very finely ctenoid : l.r. 40–46 ; l.tr. (between dorsal and lat. line) 5. Cheeks, opercles, and interorbital space scaly.

Length.—Up to 170 mm.

Colour (as preserved).—Greyish, with faint dark cross-bars ; soft dorsal, anal, and caudal with faint dark spots ; pectoral and ventral blackish with white spots.

Locality.—Natal coast, 22–26 fathoms.

Distribution.—Indian seas, 45–148 fathoms.

Type of *nigripinnis* in South African Museum ; of *natalensis* in coll. Govt. Marine Survey.

There is no doubt that the Natal specimens are identical with Alcock's species. I have examined the type and other specimens of *nigripinnis* and find that the original scale-count was erroneous. Apparently closely allied to *P. heterura* Blkr.

The single specimen described as *P. natalensis* has A III, but otherwise agrees very well with this species.

Subgen. Dendrochirus Swains.

Pterois brachyptera C. and V.

Short-finned Butterfly-fish.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 270.
1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 126.
1877. Bleeker, Atl. Ichthyol., vol. ix, pl. cdxv, fig. 3.
1913. Weber, Siboga Exp. Monogr. 57, p. 497.
1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

Depth about equal to length of head, $2\frac{2}{3}$–$2\frac{4}{5}$ in length of body. Eye subequal to length of snout, about $3\frac{1}{2}$ in length of head, greater than interorbital width. Supraorbital, occipital, preorbital, and cheek ridges finely spinose. Fleshy tentacles over eye and maxilla. D XIII 9–10. A III 6. P 16, the upper rays branched, not reaching base of caudal. V I 5, reaching origin of anal. Scales moderate, ctenoid : l.r. 40–45 ; l.tr. (between dorsal and lat. line) 8. Cheeks, opercles, occiput (but not interorbital) scaly.

Length.—Up to 130 mm.

Colour.—Reddish, with broad dark cross-bands ; spinous dorsal barred with dark ; soft dorsal, anal, and caudal with black spots ;

ventral black with white spots; pectoral barred with black and white.

Locality.—Natal coast.

Distribution.—East coast of Africa, East Indies to Australia and Samoa.

**Pterois zebra* C. and V.

Striped Butterfly-fish.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 367.
1834. Quoy and Gaimard, Voy. Astrol., Poiss., p. 692, pl. xi, fig. 6.
1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 126.
1877. Bleeker, Atlas Ichthyol., vol. ix, pl. cdxi, fig. 1.
1878–88. Day, Fish. India, p. 153.
1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 31.

Depth of body $3\frac{1}{2}$, length of head $3\frac{1}{2}$ in total length (including caudal). Eye $3\frac{1}{2}$ in length of head, equal to length of snout, and $1\frac{1}{3}$ times the interorbital width. Maxilla reaching to below anterior $\frac{1}{3}$ of eye. Interorbital space deeply concave, with 2 ridges ending posteriorly in spines. Supraorbital ridge with 2–3 spines, postorbital ridge serrate. A pair of nasal spines. Three strong occipital and 4 temporal spines. Preorbital with stellate ridges, continued across cheeks to preopercular spine, below which are 3 spines. Fleshy tentacles on head, a long one over eye, and another overhanging maxilla. D XIII 11. A III 6–7, 3rd spine slightly the longest. P 17, reaching to base of caudal. V I 5, reaching to origin of anal. Scales moderate: l.r. 50–55; l.tr. (between dorsal and lateral line) 9. Interorbital scaleless.

Length.—Up to 170 mm.

Colour.—Reddish, with broad dark cross-bands, eye with radiating dark streaks, three of which are continued across the cheek; dorsal spines annulated; soft dorsal, anal, and caudal with dark spots; ventrals dark with light markings; pectorals light with zig-zag dark cross-bars; a white spot in axil.

Locality.—Natal coast, 23 fathoms.

Distribution.—Indian seas, East Indies.

Gen. Apistus Cuv.

1828. Cuvier, Règne Anim., ed. 10, p. 127.
1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 391.
1904. Jordan and Starks, Proc. U.S. Nat. Mus., vol. xxvii, p. 146.

Body oblong, moderately compressed. Scales moderate, feebly ctenoid. Eyes dorso-lateral. Head not cuirassed, without strong ridges; no fleshy tentacles, but three barbels on lower jaw. Preorbital and preopercle with strong spines; the posterior preorbital spine long and directed backwards, the 2 anterior ones short and projecting forwards. Teeth in villiform bands on jaws, vomer, and palatine. Dorsal fin with long spinous and short soft portions. Anal with 3 spines and 7–9 branched rays. Pectoral elongate, reaching to end of anal, rays simple, connected by membrane, the lower ray free. Ventral moderate. Caudal rounded. Air-bladder present. A cleft behind the 4th gill.

Small fishes inhabiting the shallow waters of the Indo-Pacific. The few species are all very closely allied, and should perhaps all be united under one name.

Apistus faurei G. and T.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. iv, pt. 2, p. 176.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 410.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 29.

Depth $3\frac{1}{3}$–$3\frac{1}{2}$, length of head 3, in length of body. Eye subequal to snout, 4 in length of head, 3 times the interorbital width (not 3 *in* interorbital width, as written in original description). Supraorbital ridges smooth, the occipital ridges not ending in spines. Angle of preopercle with 4 blunt spines below the strong one. Barbels longer than length of snout, $\frac{1}{3}$ length of head. D XV 9. A III 7–8. P 10+1, reaching to end of base of anal, the detached ray reaching not quite to end of ventral, its length equal to distance from tip of snout to spine of preopercle. Ventrals reaching to vent. Scales scarcely ctenoid, but with jagged edges: l.r. about 65; l.tr. (between dorsal and lat. line) 9. Head naked except for a small patch of scales behind end of maxilla. Gill-rakers 12–13 on lower part of anterior arch.

Length.—Up to 140 mm.

Colour.—Greyish-brown, more or less rose-tinted; spinous dorsal with a small black spot between 1st and 2nd, and a larger one between 8th–12th spines; pectoral blackish, upper ray and the free ray white; ventrals light; soft dorsal and caudal with grey cross-bands; anal with a dark cross-band.

Locality.—Natal coast, 15–30 fathoms.

Type in South African Museum.

Gen. Amblyapistus Blkr.

1876. Bleeker, Versl. Ak. Amsterd., vol. x, p. 384.

Body oblong, compressed. Scales, if present, rudimentary. Head large, not cuirassed; no fleshy tentacles. No barbels. Preorbital and preopercle with strong sharp spines. Villiform teeth in jaws and on vomer. Spinous portion of dorsal long, anteriorly elevated. Anal with 3 spines and 5–8 rays. Ventral with 1 spine and 4–5 rays. Pectoral without free ray. Caudal rounded. Soft rays branched. Air-bladder present. No cleft behind 4th gill.

Small fishes, with velvet-like skin, inhabiting the shallow waters of the Indo-Pacific.

Key to the South African species.

1. Second and third dorsal spines longer than head . . . . *marleyi.*
2. Second and third dorsal spines shorter than head . . . *taenionotus.*

**Amblyapistus marleyi* Regan.

1919. Regan, Ann. Durban Mus. vol. ii, pt. 4, p. 202, text-fig. 5.

Depth $2\frac{4}{5}$, length of head $3\frac{3}{5}$, in length of body. Eye 3 in length of head. Maxilla extending to below anterior $\frac{1}{4}$ of eye. Anterior profile of head nearly vertical. Preorbital spine strong, reaching to below hind margin of eye. Preopercular spine strong, reaching to opercular margin. D XV 8, 1st spine short, above anterior margin of eye, 2nd and 3rd longest, $\frac{1}{3}$ length of body. A III 6. P 12. Lateral line tubules ?

Length.—130 mm.

Colour.—Brown, spotted and marbled with blackish.

Locality.—Natal coast.

Type in British Museum.

**Amblyapistus taenionotus* (C. and V.).

1802. Lacépède, Hist. Nat. Poiss., vol. iv, pl. iii, fig. 2 (not description).

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 404.

1850. Bianconi, Spec. Zool. Moss., p. 219.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 136.

1878–88. Day, Fish. India, p. 157, pl. xxxviii, fig. 5.

Depth $2\frac{4}{5}$, length of head 3, in length of body. Eye $3\frac{1}{3}$–4 in length of head. Maxilla extending to below anterior quarter of eye. Anterior

profile of head nearly vertical. Preorbital spine moderate, with a small one at its base. Preopercle with 1 sharp spine a little above its angle, and 3–4 blunt ones on lower margin. D XVI–XVII 7–8, 1st spine short, above anterior margin of eye, 2nd and 3rd longest, $\frac{2}{3}$ length of head. A III 5–7. P 12. First 16 lateral line tubules distinct, others coalesced.

Length.—Up to 125 mm.

Colour.—Reddish, with irregular brownish spots, a dark mark between 5th and 6th dorsal spines.

Locality.—Mozambique.

Distribution.—Indian and East Indian seas.

Tetraroge binotata Peters (Günther, Cat. Fish. Brit. Mus., vol. ii, p. 134), from the coast of Mozambique, appears to belong to this genus. In fact, *A. marleyi* seems very similar to it. *A. binotata* has : D XV 9, 1st spine $\frac{1}{3}$ length of 2nd, which is the longest ; A III 6, 1st spine $\frac{1}{2}$ the 2nd, which is a little over $\frac{1}{3}$ the 3rd ; depth equal to length of head, $3\frac{1}{2}$ in length of body ; eye equal to snout, $3\frac{1}{4}$ in length of head ; about 24 tubules in the lateral line.

Gen. Coccotropus Kaup.

1858. Kaup, Arch. Naturg., vol. xxiv, p. 282 (or p. 333).

1904. Jordan and Starks, Proc. U.S. Nat. Mus., vol. xxvii, p. 169 (*Erisphex*).

Body oblong, compressed. Scales absent, or rudimentary in the form of granular papillae. Head large, not cuirassed, no fleshy tentacles. No barbels. Preorbital and preopercle with strong blunt spines. Villiform teeth in jaws and on vomer. Spinous portion of dorsal long, not elevated anteriorly. One or two weak anal spines and 7–10 rays. Ventral with 1 spine and 2–3 rays. Pectoral without free ray. Caudal rounded. All the soft rays simple, unbranched. Air-bladder present. No cleft behind 4th gill.

A genus of small Indo-Pacific fishes, distinguished by the granulate skin and the simple fin rays. Seven species seem to be referable to the genus. They are all closely allied ; the South African species seems particularly close to the East Indian *C. obbesi* Weber.

Coccotropus monacanthus (Gilch.).

1906. Gilchrist, Mar. Invest. S. Afr., vol. iv, p. 145, pl. xxxvii (*Tetraroge*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 410.

Depth $3\frac{1}{5}$, length of head $2\frac{2}{3}$–$2\frac{4}{5}$, in length of body. Eye $4\frac{1}{2}$ in length of head, slightly less than snout, subequal to interorbital width. Interorbital space concave, with 2 parallel strong ridges from snout to dorsal fin. Two postorbital ridges. Preopercle with 4 spines, preorbital with 2 strong spines. Suborbital with 2 blunt spines. Opercle with 1 spine at angle, and 2 small ones on margin. D XIII 10, arising over centre of eye, first 3 spines longest. A I 8, the spine scarcely stronger than the rays. P 12. V I 3, (not 5, as in original description). Head, body, and dorsal and pectoral fins covered with granular papillae. Lateral line tubules 10. Skin under lower jaw papillose, but no barbels. Gill-rakers rudimentary, 3–4 on anterior arch.

Length.—Up to 47 mm.

Colour (as preserved).—Brown, speckled with black on body and fins.

Locality.—Natal coast, 20–26 fathoms.

Type in South African Museum.

Coccotropsis n. g.

Differs from *Coccotropus* in having 3 anal spines and 4 rays, all the soft fin rays apically branched, and the preorbital and preopercular spines sharp. Scales absent, skin perfectly smooth. Gill-rakers almost rudimentary, 7 on anterior arch.

The original genus *Tetraroge* has been considerably subdivided, and the adoption of this course necessitates, unfortunately, another new genus.

Coccotropsis gymnoderma (Gilch.).

1906. Gilchrist, Mar. Invest. S. Afr., vol. iv, p. 147, pl. xxxvii (*Tetraroge*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 137.

Depth 3 (or a trifle over), length of head $2\frac{3}{4}$, in length of body. Eye subequal to snout, 4 in length of head. Interorbital space $\frac{4}{5}$ diameter of eye, concave, with 2 strong ridges which are close together at the level of centre of eye and diverge forwards and backwards, forming an hourglass-like sculpture. Both preorbital spines pointing backwards, the posterior one the longer. A strong spine on preopercle, with 3 smaller ones below it. Opercular and temporal spines sharp. Suborbital ridge smooth. D XV 5–6, 3rd spine longest, about $\frac{1}{2}$ length of head, 1st shortest. A III 4, 3rd spine longest. P 11. V I 3. Lateral line tubules 7–10. Three large pores on each

ramus of lower jaw, one above middle of eye between supraorbital and interorbital ridges.

Length.—Up to 53 mm.

Colour.—Brownish, brick-red in patches, chiefly behind head, in middle of body, and on caudal region ; head, body, and fins speckled with darker.

Locality.—False Bay to Algoa Bay, 5–60 fathoms.

Type in South African Museum.

Fam. 2. Synanciidae.

Body moderately elongate, naked. Head not completely cuirassed, more or less spiny or rugose. Two nostrils on each side. Gill-membranes united with isthmus. Pseudobranchiae present. A single pair of upper dentigerous pharyngeals. Spinous dorsal longer than soft dorsal (except in *Trachicephalus*). Anal with 2 spines, more or less flexible. Pectorals large, with the lower rays sometimes detached. Ventrals close together, with 1 spine and 4–5 rays.

A small family of Indo-Pacific fishes similar in general appearance to the Scorpaenids, and also similar in habits.

Key to the South African genera.

1. Pectoral with no free ray . . . . . [*Synanceia*].
2. Pectoral with one free ray . . . . . *Minous.*
3. Pectoral with 3 free rays . . . . . *Choridactylus.*

Synaceia horrida, a widely distributed Indo-Pacific form of uncouth appearance, is included in the key, as there is every probability of its being found within the limits of South Africa as here defined.

Gen. Minous C. and V.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 420.

Body oblong, compressed. Head with rough ridges. Two sharp spines on preorbital, one on preopercle. A groove across the occiput. Villiform teeth on jaws and vomer. Gill-rakers short. A cleft behind 4th gill. Lower jaw with barbels. Dorsal with 10–11 stiff spines and 9–12 rays. Anal with 2 flexible spines. Ventral with 1 spine and 5 rays. Pectoral with 1 detached ray. All the soft rays simple. Caudal rounded.

Small Indo-Pacific fishes.

Minous superciliosus G. and T.

1908. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 2, p. 177.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 410.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 29.

Depth 3, length of head $2\frac{1}{2}$, in length of body. Eye equal to snout, $3\frac{1}{2}$ in length of head. Interorbital space $\frac{4}{5}$ diameter of eye, concave, with a median and 2 submedian ridges. Supraorbital, occipital, temporal, and nasal ridges rugulose and pitted. Preorbital radiately ridged, anterior spine short, posterior one $\frac{3}{4}$ diameter of eye, both sharp. Suborbital radiately ridged. Preopercle with a strong sharp spine, a smaller one below it, and 3 blunt spines below. Opercle with 2 feeble ridges. Maxilla reaching to below anterior $\frac{1}{3}$ of eye. Lower jaw fimbriate and papillose below, with one barbel about in middle and another near hind end of ramus. Cheek, maxilla, and breast finely papillose. A fringe of fimbriate tentacles on upper margin of eye. D XI 12, 1st spine very short, $\frac{1}{2}$ diameter of eye. A II 10. Ventral reaching to base of 1st anal ray. Pectoral 11+1, equal to depth of body. Gill-rakers 9 on lower part of anterior arch.

Length.—Up to 105 mm.

Colour (as preserved).—Brownish, 7 dark cross-bands on upper part of body, extending on to base of dorsal fin ; margin of membrane between dorsal spines blackish ; soft dorsal, anal, and caudal with faint dark specks ; ventral dark towards its hind end ; pectoral with dark spots arranged in regular cross-bands.

Locality.—Zululand coast, 26 fathoms.

Type in South African Museum.

This species is extraordinarily close to *M. trachycephalus* Blkr., and may eventually prove to be the same species.

Gen. Choridactylus Rich.

1848. Richardson, Voy. Samarang, Fishes, p. 8.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 151 (*Chorismodactylus*).

1902. Gilchrist, Mar. Invest. S. Afr., vol. ii, p. 101 (*Choridactylodes*).

Body oblong, compressed. Skin papillose. Head with prominent ridges. Two sharp spines on preorbital, one on preopercle. A groove across the occiput. Villiform teeth in jaws only. Gill-rakers short. A cleft behind 4th gill. Lower jaw with barbels. Dorsal with 13–15 stiff spines, and 8–9 rays. Anal with 2 moderately stiff spines. Ventral

with 1 spine and 5 rays. Pectoral with 3 detached rays. Soft rays branched. Caudal rounded.

This genus contains one Indo-Pacific species, *multibarbis* Rich., from which the Natal species differs only in the filamentous upper pectoral ray. There is no generic difference.

Choridactylus natalensis (Gilch.).

1902. Gilchrist, *loc. cit.*, p. 102, pl. v.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 410 (*Choridactylodes*).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 30 (*Choridactylodes*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 254 (*Choridactylodes*).

Depth 3, length of head $3\frac{1}{4}$, in length of body. Eye $3\frac{1}{3}$–$3\frac{1}{2}$ in length of head, rather less than snout, and than the middle part of interorbital width. The width between the 2 postorbital and the 2 antorbital blunt spines is $1\frac{1}{2}$ diameter of eye. Occipital groove with 4 low ridges across it, continued backwards as strong ridges on temporal region, and enclosing a smooth circular hollow. Interorbital space deeply concave, with a ridge on either side, forming an oval hollow over each eye. Suborbital with 3 blunt spines, preopercular spine strong, with 4 blunt ones below it. Fimbriate tentacles along lateral line, 2 below each lower jaw, and 1 over each eye. D XIV(–XV) 7–9, 1st spine $\frac{2}{3}$ length of 2nd, 2nd–4th longest (Gilchrist's fig. 2 represents an abnormal specimen with an additional spine in front). A II 9. P 8–9+3, uppermost ray produced as a slender filament about as long as rest of pectoral. Lateral line well marked, but without distinct tubules. Gill-rakers 7–8 on lower part of anterior arch. (Plate XXXIII, fig. 4.)

Length.—Up to 85 mm.

Colour.—Dark brown, or brown and white mottled, or with brown spots on a light ground; dorsal and pectoral fins mottled, ventrals black-brown, anal blackish with white margin, detached pectoral rays yellow, caudal with white cross-band and white margin.

Locality.—Natal coast, 20–30 fathoms.

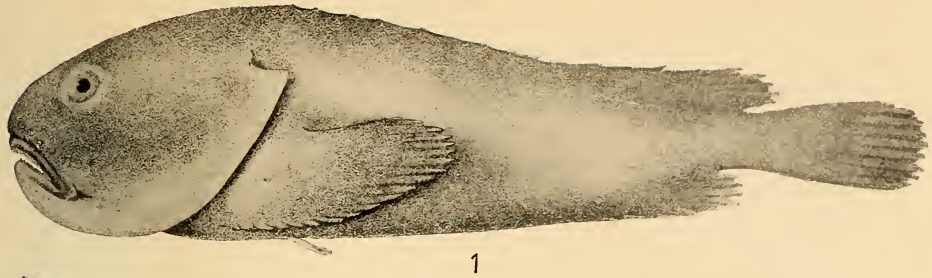
Type in South African Museum.

Fam. 3. Cottidae.

Body moderately elongate, tapering backwards from the large head; naked, or with scales, prickles, or bony plates; never uniformly scaled.

PLATE XXXIV.

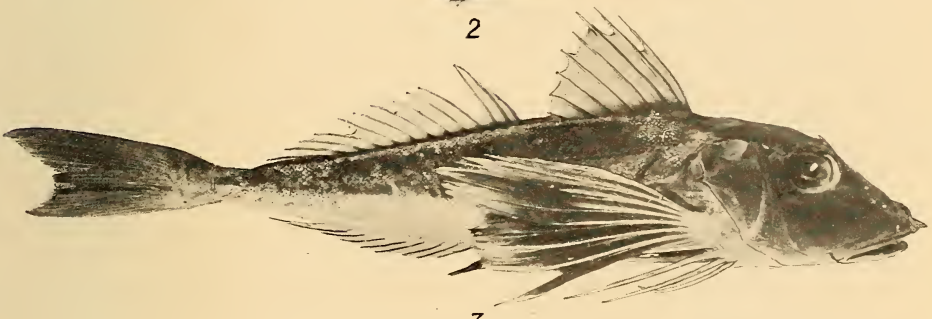
FIG.		TEXT-PAGE
1.	*Cottunculoides inermis* (Vaill.) (after Gilchrist)	923
2.	*Platycephalus heterolepis* n. sp. (original photo)	934
3.	*Chelidonichthys capensis* (C. and V.) (original photo)	940
4.	*Hoplichthys acanthopleurus* Regan (after Regan)	937
5.	*Congiopodus torvus* (Gron.) (after C. and V.) Young	928



1



2



3



4



5

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Two nostrils on each side. Gill-membranes broadly connected, often joined to isthmus. Pseudobranchiae present. One or two pairs of dentigerous upper pharyngeals. Spinous dorsal separate from the soft dorsal, or united with it in a common cutaneous sheath; soft dorsal long. Anal similar to soft dorsal, without spines. Pectorals large, the rays mostly simple. Ventrals rarely absent, normal, close together, with 1 spine and 3–5 rays. Caudal separate. usually rounded.

This family is a very large one, comprising a great variety of forms, especially characteristic of the Northern Hemisphere. There are fresh-water and marine forms, the latter mostly from shallow waters, but a few deep-sea species are known. None of them are of any value as food.

In the case of the shallow-water forms the eggs are usually attached to stones, weed, etc., and several species are known to make a kind of nest.

In South Africa only one deep-sea genus has been found.

Cottunculoides n. g.

Head very large, the body tapering rapidly to the slender tail. Mouth large, terminal, oblique. Villiform teeth in jaws; none on vomer or on palatine. Bones of the head more or less spinose, the spines not penetrating the skin. Gills $3\frac{1}{2}$, no slit behind the last arch. Gill-membranes broadly joined to isthmus. Pseudobranchiae very small. Skin naked, smooth or with small granules, loose and flabby. Spinous and soft dorsal united by and concealed in the skin. Ventrals short, with 3 rays.

The genus *Cottunculus* is sometimes included in a separate family, *Cottunculidae*, on account of the single dorsal fin and a slight difference in one of the bones (parasphenoid) of the skull.

The present genus differs from the N. Atlantic and Japanese genus *Cottunculus* by the complete absence of vomerine teeth.

Key to the South African species.

1. Head smooth . . . . . *inermis.*
2. Head spinose . . . . . *spinosus.*

Cottunculoides inermis (Vaill.).

1888. Vaillant, Exp. Travailleur et Talisman, Poiss., p. 365, pl. xxviii, fig. 2.

1904. Gilchrist, Mar. Invest. S. Afr., vol. iii, p. 7, pl. xxiv (*macrocephalus*).

1906. *Id.*, *ibid.*, vol. iv, p. 149 (*macrocephalus*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 139 (*macrocephalus*).

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 78 (*macrocephalus*).

Depth about 3, length of head $2\frac{1}{2}$, in length of body. Head smooth, without spinous processes. Eye about 7 in length of head, $1\frac{1}{2}$ in snout. Maxilla reaching to below centre of eye. No vomerine teeth. D VII–VIII 17–18. A 13–14. P 19–21. V I 3. (Plate XXXIV, fig. 1.)

Length.—Up to 290 mm.

Colour.—Light brown, paler below.

Locality.—Off Cape Point, 190–560 fathoms.

Distribution.—Off N.W. coast of Africa, 930–1495 metres.

Type of *macrocephalus* in South African Museum.

The above description is taken from the largest specimen, an ovigerous ♀, 290 mm. in length. The type is a very small specimen, 45 mm. long, and is in poor condition. A specimen 112 mm. long, apparently an immature ♂, agrees with the large specimen, but the eye is larger than length of snout, not quite 4 in length of head. Vomerine teeth are absent in all three specimens.

Cottunculoides spinosus (Gilch.).

1906. Gilchrist, Mar. Invest. S. Afr., vol. iv, p. 149, pl. xxxviii.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 139.

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 78.

Depth (at junction of head and body) $4\frac{1}{2}$, length of head $2\frac{1}{2}$, in length of body. Head with spinous projections, the largest being the occipital pair ; 1 nasal and 1 interorbital (in middle line), 3 postorbital, 1 temporal, 1 humeral, 3 preopercular, and some minor points on the suborbital and preorbital. Eye equal to snout, 4 in length of head. No vomerine teeth. D IV 10. A 10. P 16. V I 3.

Length.—78 mm.

Colour (as preserved).—Pale brown.

Locality.—Off Cape Point, 800–1190 fathoms.

Type (ovigerous ♀) in South African Museum.

Owing to the shrivelling of the hinder part of the body I am unable to check the fin-formula as given by Gilchrist.

Except for the absence of vomerine teeth, very similar to *Cottunculus torvus* Goode.

Fam. 4. Liparidae.

Body elongate, compressed behind. Skin delicate, loose, smooth or with minute prickles. Head short. Two nostrils on each side. Gill-

membranes joined to isthmus. Pseudobranchiae small, or wanting. One or two pairs of upper dentigerous pharyngeals. Spinous dorsal united with soft dorsal. Soft dorsal and anal confluent with caudal. Anal without spines. Pectorals very broad, base decurrent, some of the lower rays more or less free and prolonged. Ventrals united to form a circular suctorial disc, or completely absent. No air-bladder.

The *Liparidae* or Sea-snails are closely related to the *Cyclopteridae* or Lump-suckers, and are often included under one group : *Discoboli*. They are well represented in the Northern Hemisphere, especially in the Pacific. Most are shallow-water forms, but a few descend to considerable depths.

In some of the shallow-water forms it has been observed that the eggs are laid attached to stones and other objects, and are guarded by the male until hatched. (For post-larval stages of *Liparis* see Fage, 1918, Dan. Ocean. Exp., vol. ii, A 3, p. 119).

Key to the South African genera.

1. Ventral disc present . . . . . *Careproctus.*
2. Ventral disc absent.
   a. Mouth horizontal . . . . . *Paraliparis.*
   b. Mouth oblique . . . . . *Psednos.*

Gen. Careproctus Kröyer.

1862. Kröyer, Naturb. Tidsskr., vol. i, p. 257.

Ventral disc present. Teeth mostly simple, some of them sometimes tricuspid. Mouth horizontal. Pseudobranchiae present, but small. Caudal fin feeble, but its end distinct from dorsal and anal. Vent nearer to ventral disc than to origin of anal fin.

A genus of rather small-sized deep-water fishes, whose headquarters seem to be in the Northern Pacific.

Careproctus albescens n. sp.

Depth $4\frac{3}{4}$, length of head $3\frac{3}{4}$, in length of body. Eye $3\frac{3}{4}$ in length of head. Profile of head evenly rounded, snout rather vertical (but shape possibly altered by the specimens resting on their snouts in the jar). Teeth mostly simple, but a few tricuspid. Gill-opening not extending below base of upper pectoral ray. D ca. 50. A ca. 45. P 35, lower rays (ca. 17) not strongly produced. Diameter of ventral disc 5 in

length of head. Skin smooth. Distance of vent from posterior margin of ventral disc greater than diameter of disc, about equal to diameter of eye. Pyloric caeca 12.

Length.—Up to 100 mm. (the best preserved and type specimen 65 mm.).

Colour (as preserved).—Whitish, peritoneum dark brown.

Locality.—Off Cape Point, 630–800 fathoms.

Type in South African Museum.

With the exception of the type the specimens are all very soft and rather badly preserved, but they serve to confirm the above characters. There seems no doubt that the species is a true *Careproctus.*

Gen. Paraliparis Coll.

1878. Collett, Vid. Selsk. Forh. Christ., No. 14, p. 32.

Ventral disc absent. Teeth minute, simple. Mouth horizontal. Pseudobranchiae absent. Pectoral distinctly divided into two lobes. Caudal completely confluent with dorsal and anal. Vent far forward.

Key to the South African species.

1. Large species.	D 60.	A 50.	P 17+3	. . . . .	*copei.*
2. Small species.	D 48.	A 43.	P 14+3	. . . . .	*australis.*

Paraliparis copei G. and B.

1895. Goode and Bean, Ocean. Ichthyol., p. 279, fig. 253.

1919. Roule, Res. Sci. Camp. Monaco, vol. lii, p. 62.

Depth about $5\frac{3}{4}$, length of head about $6\frac{1}{4}$, in length of body. Eye about equal to snout, $3\frac{1}{2}$ in length of head. Interorbital width equal to postorbital length of head. D ca. 60. A ca. 50. P 17–18+3–4. Pyloric caeca 7 (Goode and Bean : 4–6).

Length.—Up to 170 mm.

Colour.—Whitish or translucent, posterior portion of body brownish ; snout, chin, gill-opening blackish ; peritoneum violet-black.

Locality.—Off Cape Point, 900–1000 fathoms.

Distribution.—N. Atlantic, 353–538 fathoms; off the Azores, 1692 metres.

Two specimens, 120 and 160 mm. in length, appear to be undoubtedly referable to this species.

**Paraliparis australis* Gilch.

1902. Gilchrist, Mar. Invest. S. Afr., vol. ii, p. 107, pl. vii.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 139.

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 78.

Depth $3\frac{2}{3}$, length of head about 4, in length of body. Eye smaller than snout, $3\frac{1}{3}$ in length of head. Interorbital width greater than postorbital part of head. D 48. A 43. P 14+3. Pyloric caeca? (Plate XXXIII, fig. 6.)

Length.—Up to 50 mm.

Colour.—Translucent.

Locality.—Off Cape Point, 210–312 fathoms.

Type ? lost.

PSEDNOS n. g.

Ventral disc absent. Teeth simple on jaws, none on vomer or palatine. Mouth very oblique, lower jaw projecting. No barbels. Pseudobranchiae absent. Pectoral not divided into two lobes. Caudal completely confluent with dorsal and anal. Vent far forward, between lower extremities of bases of pectorals. General outline tadpole-like, head and trunk nearly circular, tail abruptly narrower.

The distinctive shape of the body, which is not due to distension with eggs, and the strongly oblique mouth serve to distinguish this genus from all the other genera in this family. Resembling *Amitra* in the pectoral, but differing in the absence of pseudobranchiae, as well as in the above two characters.

Psednos micrurus n. sp.

Depth $3\frac{1}{4}$, length of head $4\frac{1}{2}$, in length of body. Eye 3 in length of head, equal to snout, and $1\frac{1}{2}$ in postorbital portion of head (excluding opercular flap). Maxilla reaching to below anterior third of eye. Lower jaw projecting, with a knob on chin. D ca. 35. A ca. 30. Distance from snout to origin of dorsal nearly twice, to origin of anal $2\frac{1}{3}$ times, length of head. P 17, rays at least as long as head, the lower rays probably slightly longer, but mutilated. Pyloric caeca 4, short and stout. (Plate XXXIII, fig. 5.)

Length.—Up to 45 mm.

Colour (as preserved).—Greyish-brown.

Locality.—Off Cape Point, 660–700 fathoms.

Type (ovigerous ♀) in South African Museum.

The type has the body cavity filled with a number of large eggs, 1 mm. in diameter. Another specimen of the same size is rather badly mutilated, but confirms the characters above given.

Fam. 5. Congiopodidae.

Horse-fishes.

Body moderately elongate, compressed. Skin naked or granulate. Head not completely cuirassed, sometimes with spines. A single nostril on each side. Gill-openings restricted to above the pectorals. Pseudobranchiae present. Three pairs of toothed upper pharyngeals. Spinous and soft dorsals united, spines strong. Anal without strong spines. Pectorals without free rays. Ventrals close together, with 1 spine and 5 rays. Snout produced. Mouth small, protractile. Villiform teeth sometimes in jaws, none on vomer or palatine. Air-bladder present. No pyloric caeca.

The Horse-fishes form a small family of two genera with an austral distribution, being found in South Africa, Kerguelen, South Australia, and South America. In South Africa they are commoner in the cooler waters of the west coast, and are rarely met with far to the east. If, however, the genera *Snyderina* and *Ocosia* be included in this family, the range extends up to Japan. Regan in 1913 does not admit them to the family as characterised above, from which they differ in having 3 anal spines and the gill-openings not restricted to above the pectorals.

Gen. Congiopodus Perry.

1810. Perry, Arcana, pl. lv and letterpress.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 380 (*Agriopus*).

1926. McCulloch, Rec. Austr. Mus., vol. xv., pt. 1, p. 37.

Dorsal spines 17–21, the first arising above the eye, no deep notch between spinous and soft portions. Villiform teeth in jaws. Ventral fins arising immediately behind bases of pectorals. Head without strong spines.

Key to the South African species.

1. No spines on snout. Skin papillose or smooth . . . . . *torvus.*
2. Spines on snout. Skin spinulose . . . . . *spinifer.*

Congiopodus torvus (Gronov.).

72 *Horse-fish ; Paardevis.*

1760. Gronovius, Act. Helv., vol. vii, p. 47, pl. iii, fig. 2. ?

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 382.

1829. *Id., ibid.*, p. 387, pl. xci (*verrucosus*).

1835. Burton, Proc. Zool. Soc., vol. iii, p. 116 (*unicolor*).

Gronovius, L.T. 1772, Animalium rariorum fasciculus. Pisces. Acta Helvitica, 7: 43-52.

1861. Castelnau, Mem. Poiss. Afr. Austr., p. 7 (*multidentatus*).

1903. Gilchrist, Mar. Invest. S. Afr., vol. ii, p. 189 (*verrucosus* egg).

1914. Gilchrist, Mar. Biol. Rep., vol. ii, p. 102 (habits).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 138 (references).

Depth 3, length of head $3\frac{1}{2}$–$3\frac{3}{4}$, in length of body. Eye $1\frac{1}{3}$ in snout, 4 in length of head, nearly twice the (narrowest part of) interorbital width. No spines on snout or forehead. Supra- and sub-orbital, temporal and preopercular regions more or less granulate, the granules tending to become obscured in the adult by the fleshy skin. Upper part only of interorbital space granulate. Skin papillose in the young (*verrucosus*), quite smooth, or nearly so, in the adult; sometimes the papillae towards the upper region of the head conceal minute spinules, but the feel of the skin is soft and velvety. Lips thick and fleshy, corrugate internally. Teeth villiform on the jaws, very variable in development, sometimes forming a well-marked band, sometimes reduced to nearly a single row, and often difficult to observe owing to the fleshy nature of the gums. D XX–XXI 13–14, 1st spine $\frac{2}{3}$ (young) to $\frac{1}{2}$ (adult) length of 2nd, 3rd or sometimes 3rd and 4th longest. A 8, the 1st ray more or less spiniform. Gill-rakers 8–9 on lower part of anterior arch. No indication of lateral line. (Plate XXXIV, fig. 5.)

Length.—Up to 675 mm.

Colour.—Light brown with 2 more or less regular rows of round or oval darker spots along sides of body, more or less confluent into a solid stripe; belly and forehead with irregular small round spots; dorsal fin with spots which are arranged on the anterior part of the spinous portion in more or less regular oblique rows; pectoral and caudal with more or less regular rows of spots; iris with alternate dark and light patches: older specimens tend to become nearly uniform dark brown, sometimes almost black.

Locality.—Table Bay, False Bay to Hermanus.

The variation in the teeth is remarkable. I have seen specimens, otherwise identical, in which the teeth form either a broad band (*multidentatus*) or a narrow band, or are reduced to a few isolated ones scattered along the jaws.

Congiopodus spinifer (Smth.).

Spiny Horse-fish.

1849. Smith, Illustr. Zool. S. Afr. Pisces, pl. iii.

1904. Gilchrist, Mar. Invest. S. Afr., vol. iii, p. 144, pl. ix, figs. 49, 50 (development).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i. pt. 4, p. 411 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 138 (references).

1919. Gilchrist and Hunter, Tr. Roy. Soc. S. Afr., vol. viii, p. 3, pl. i, fig. 4, pl. ii, fig. 5 (egg, larva).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 254.

Depth 3, length of head $3\frac{3}{4}$, in length of body. Eye subequal to snout, $3\frac{1}{4}$–$3\frac{1}{2}$ in length of head, twice the (narrowest part of) interorbital width. A pair of spines on the snout immediately in front of the eyes, and 3 sharp or jagged spines on the anterior part of each preorbital above the angle of the mouth. Orbital, interorbital, temporal, preopercular, and opercular regions granulate, more strongly so in the young than the adult. Supraorbital, suborbital, temporal, postorbital, and opercle each with a ridge which is prominent in the young, becoming less so in the adult. Skin with scattered spinules, being distinctly rasp-like to the touch. Lips thick, fleshy, feebly corrugated. Teeth variable as in *torvus*, forming a well-marked band or nearly obsolete. D XIX–XXI+12–14, 1st spine $\frac{2}{3}$ (or a little more) 2nd, 2nd–4th evenly graduated to the 5th, which is longest. A 9–10, 1st ray more or less spiniform. Gill-rakers 8–9 on lower part of anterior arch. Lateral line more or less distinct, but always marked by a series of nearly equidistant spinules, or groups of 2–3 spinules.

Length.—Up to 312 mm.

Colour.—Brownish or greyish, belly lighter, more or less silvery ; back and sides marbled and spotted with darker brown ; all the fins with series of spots forming more or less definite bands ; membrane of dorsal near upper margin with a black blotch between 1st and 2nd spines, and one on either side of the 6th or the 7th spine.

Locality.—Saldanha Bay, Table Bay, False Bay, Mossel Bay, down to 80 fathoms ; Natal and Zululand coast.

Type in the British Museum.

The occurrence of this species, or indeed of any species of this genus, on the Zululand coast is rather remarkable.

Fam. 6. Platycephalidae.

Flat-heads.

Body elongate, cylindrical, or anteriorly depressed. Head more or less strongly depressed, armed above with spines and bony ridges. Skin with ctenoid scales. Lateral line present. Two nostrils on

each side. Gill-membranes free. Pseudobranchiae present. Villiform teeth in jaws and on vomer and palatine ; enlarged canine teeth sometimes present. Spinous dorsal shorter than and separate from soft dorsal. Anal with or without spines. Pectorals without appendages, but the tips of the lower rays more or less free. Ventrals widely separated, below or behind bases of pectorals, with 1 spine and 5 rays. Caudal separate, truncate, or rounded. No air-bladder. Pyloric caeca moderately numerous.

An Indo-Pacific family of marine fishes which are mostly bottom-dwellers in shallow or moderately deep water.

Key to the South African genera.

1. Ventrals behind base of pectorals. Head strongly depressed . *Platycephalus.*
2. Ventrals below bases of pectorals. Head moderately depressed *Parabembras.*

Gen. Platycephalus Bl.

1795. Bloch, Ichthyol., vol. xii, p. 90.

1925. Jordan and Hubbs, Mem. Carn. Mus., vol. x, p. 285.

Head broad and strongly depressed. Body depressed anteriorly. A detached spine in front of spinous dorsal. Ventrals behind bases of pectorals. Anal without spines.

This genus has been subdivided into a number of genera, which are here regarded as only subgenera ; a sharp differentiation of these "genera" seems impossible without excessive subdivision (see Jordan and Hubbs, *loc. cit.*).

Key to the South African species.

I. Head almost or quite smooth. Vomer with teeth in a transverse crescentic band. Scales very small. Lateral line smooth (*Platycephalus*) . *indicus.*

II. Head more or less strongly spinose. Vomer with teeth in two separate longitudinal patches.

A. Lateral line unarmed.

1. Two preopercular spines.

a. A cirrus over eye (*Insidiator* part) . . *tentaculatus.*

b. No cirrus over eye (*Cocius*) . . . . *crocodilus.*

2. Three preopercular spines . . . . . *pristis.*

B. Lateral line spinose. No cirrus over eye.

1. Lateral line spinose anteriorly only . . . . *heterolepis.*

2. Lateral line spinose throughout (*Grammoplites*) . . *scaber.*

Platycephalus indicus (Linn.).

Sand-fish.

1758. Linné, Syst. Nat., ed. 10, p. 250.

1878. Bleeker, Atl. Ichthyol., vol. ix, pl. cdxviii, figs. 3, 3*a*.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 411 (*insidiator*) (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 140 (*insidiator*) (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 255 (*insidiator*).

Length of head $3\frac{1}{5}$–$3\frac{2}{5}$ in length of body. Eye 2 in snout, 7–9 in length of head, equal to (young), or twice in, interorbital width. Ridges on head quite smooth. Two preopercular spines of about equal length. A skinny flap on opercular margin below preopercular spines. Vomerine teeth canine-like, in a crescentic transverse band. Palatine with a single row of canine-like teeth. D I+VII+13. A 13. Scales very small : l.l. ca. 120, quite smooth.

Length.—Up to 500 mm.

Colour.—Brownish, vaguely and irregularly mottled or spotted with darker ; fins yellowish, more or less spotted ; caudal with a median horizontal black stripe, and an oblique black stripe above and below.

Locality.—East London, Natal coast, Delagoa Bay, and coast of Portuguese East Africa.

Distribution.—Indo-Pacific.

**Platycephalus tentaculatus* Rüpp.

Tentacled Flat-head.

1838. Rüppell, Neue Wirbelt. Fische, p. 104, pl. xxvi, fig. 2.

1876–81. Günther, Fische d. Südsee, vol. ii, p. 166, pl. cvii, figs. A, B.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 413.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 255.

Length of head 3 in length of body. Head ridges denticulate, strong. Two preopercular spines, the upper stronger than the lower. Fleshy tentacles above nostril and eye, and 2 below preopercular spines. Interorbital width less than vertical diameter of eye. A skinny opercular flap under preopercular spines. Vomerine teeth in separate longitudinal patches. D I+VII–VIII+11. A 11. Scales small : l.l. 65–70, quite smooth.

Length.—Up to 540 mm.

Colour.—Greenish-brown, mottled or spotted with darker; fins spotted; ventrals with large black spots.

Locality.—Kosi Bay (Zululand), Delagoa Bay.

Distribution.—Red Sea, East coast of Africa, East Indies.

This is the only South African species with a tentacle over the eye.

Platycephalus crocodilus Til.

Spotted Flat-head.

1812. Tilesius, Krusenstern's Reise, pl. lix, fig. 2.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 243 (*punctatus*).

1891. Sauvage, Poiss. Madagascar, p. 307, pl. xxxvi, figs. 5, 5*a* (*punctatus*).

1908. Jordan and Richardson, Proc. U.S. Nat. Mus., vol. xxxiii, p. 638, fig. 4 (references).

1909. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. vi, pt. 3, p. 253 (*malabaricus* non C. and V.).

1911. *Id.*, *ibid.*, vol. xi, pt. 2, p. 36 (*punctatus*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 412 (*malabaricus* and *punctatus*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 255 (*malabaricus*).

Length of head 3–3$\frac{1}{5}$ in length of body. Eye 1$\frac{1}{2}$ in snout, 4$\frac{1}{2}$–5$\frac{3}{4}$ in length of head. Interorbital space 1$\frac{1}{2}$ in diameter of eye (Jordan and Richardson say 2$\frac{1}{2}$, Sauvage figures it as 2$\frac{1}{2}$, and Bleeker as 2). Supraocular ridge with 5–6 denticulations; a sharp spine at anterior corner of orbit; 2 small spines between anterior nostrils; suborbital ridge with 3 distant spines, 2 below eye, the other almost opposite posterior nostril; opercle with 2 low ridges ending in spines; scapular and occipital ridges each with 2 spines; 3 postorbital spines. Two preopercular spines, the upper 1$\frac{1}{2}$ in eye, the lower much shorter and projecting somewhat downwards. Opercular membrane with skinny flap under preopercular spines. Vomerine teeth in 2 longitudinal patches, villiform; palatine teeth in a narrow band. D I+VII–VIII+11–12. A 11. Scales small: l.l. 80–90, quite smooth.

Length.—Up to 400 mm.

Colour.—Brownish, with 4–5 dusky cross-bands across back, and (usually) numerous small round black spots; spinous dorsal, ventrals, and caudal more or less blackish; soft dorsal, anal, and pectoral more or less spotted.

Locality.—Natal and Zululand coast.

Distribution.—Indo-Pacific.

There seems little doubt that the Natal specimens should be identified with *crocodilus*, in spite of the differences in the relative proportions of the eye and interorbital width. All the other characters are in agreement.

The specimens identified by Gilchrist and Thomson as *malabaricus* C. and V. are exactly the same as those identified as *punctatus* C. and V. The eye was measured vertically in the latter and horizontally in the former case. In the present descriptions, the horizontal diameter is always taken unless the vertical diameter is definitely mentioned.

**Platycephalus pristis* Peters.

1855. Peters, Wiegm. Arch., p. 240.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 188.

1898. Jatzow and Lenz, Voeltzkow's Reise, Abh. Senckenb. Ges., vol. xxi, p. 505, pl. xxxiv, fig. 3, *a–c*.

Interorbital width $\frac{1}{4}$ diameter of eye. Top of head with several series of spines and another series between preorbital and preopercle. A pair of nasal spines. Three preopercular spines, the uppermost one (middle one in Jatzow and Lenz's figure) longest. D I+VII+13. A 14. Scales : l.l. 51, smooth.

Colour.—Yellowish-brown, marbled with darker on head and sides, fins with spots arranged in bands.

Locality.—Mozambique coast.

Distribution.—Zanzibar.

Platycephalus heterolepis n. sp.

Length of head $2\frac{3}{4}$ in length of body. Eye $1\frac{1}{2}$ in snout, $4\frac{1}{3}$ in length of head. Interorbital width $2\frac{1}{4}$ in eye. Supraorbital, infraorbital, scapular, and occipital ridges finely serrulate. A pair of nasal spines. Two antorbital spines. Two preopercular spines, the upper stronger and half the diameter of eye, a third still smaller below. Opercular membrane scarcely indented below preopercular spines. Vomerine teeth in two longitudinal bands ; palatine teeth in a band about as wide as vomerine ; no canines. D I+VIII+12. A 12. Scales moderate : l.l. 52–55, the first 15–20 with small spines ; scales on the breast and throat larger than the others, feebly ctenoid. (Plate XXXIV, fig. 2.)

Length.—200 mm.

Colour.—Brownish; spinous dorsal blackish; all the other fins, except anal, spotted.

Locality.—Delagoa Bay.

Type in South African Museum.

This species is closely allied to *P. tuberculatus* C. and V., *townsendi* Regan (1905, J. Bomb. Nat. Hist. Soc., vol. xvi, p. 323, pl. A, fig. 1), and *jugosus* McCull. (1914, Res. F.I.S. "Endeavour," vol. ii, pt. 3, p. 144, pl. xxx, fig. 2 and text-fig. 11). It resembles *tuberculatus* in the sculpturing of the head, but is like *jugosus* in not having the infra-orbital ridge projecting over the cheek below it. It differs from both these species, and, so far as can be ascertained from descriptions, from all other species, by the enlarged scales on the breast and throat.

Platycephalus scaber (Linn.).

Rough-scaled Flat-head.

1754. Linné, Mus. Ad. Fred., vol. ii, p. 66.

1878. Bleeker, Atl. Ichthyol., vol. ix, pl. cdxix, figs. 5, 5*a*.

1878–88. Day, Fish. India, p. 275, pl. lx, fig. 4.

1891. Sauvage, Poiss. Madagascar, p. 305, pl. xxxvi, figs. 1, 1*a*.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 412 (references).

Length of head $2\frac{2}{3}$–3 in length of body. Eye 1–$1\frac{1}{2}$ in snout; $3\frac{3}{4}$ (young), 4–5 in length of head. Interorbital width $1\frac{1}{2}$ (young)–$2\frac{1}{2}$ in eye. Supraorbital, occipital, scapular, opercular, and infraorbital ridges spinulose. A pair of small nasal spines. One antorbital spine, flanked by one or two smaller ones. Two preopercular spines, the upper $\frac{2}{3}$ length of eye, lower $\frac{1}{2}$ length of upper. Opercular membrane without flap below preopercular spines. Vomerine teeth in two longitudinal patches; palatine teeth in a narrow band; no canines. D I +VIII+12. A 12. Scales moderate: l.l. 55, each scale armed with a strong spine.

Length.—Up to 200 mm.

Colour.—Brownish, spinous dorsal blackish; ventrals, anal, and caudal dark grey; soft dorsal and pectorals spotted.

Locality.—Coast of Natal and Zululand.

Distribution.—Indian Ocean.

The South African specimens appear to belong to this species. All that I have seen possess a relatively larger eye, but this may be due to their being young specimens.

Gen. Parabembras Blkr.

1874. Bleeker, Versl. Ak. Amst., (2), vol. viii, p. 370.

1925. Jordan and Hubbs, Mem. Carn. Mus., vol. x, p. 281.

Head not strongly depressed. Body cylindrical. No detached spine in front of spinous dorsal. Ventrals inserted below bases of pectorals. Anal fin short, with 2–3 spines and 5–6 rays.

One other species from Japan, besides the South African one.

Parabembras robinsoni Regan.

1921. Regan, Ann. Mag. Nat. Hist., (9), vol. vii, p. 418.

1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 75 (*curtus* non Temm. and Schleg.).

Depth 5, length of head $2\frac{1}{2}$, in length of body. Eye equal to snout, $3\frac{2}{3}$–$3\frac{4}{5}$ in length of head. Interorbital width $3\frac{2}{3}$–4 in eye. Vomerine teeth in an angular transverse band. Maxilla reaching not quite to below middle of eye. A pair of small nasal spines. A pair of small spines in front of each eye. Supraorbital ridge with 9–15 serrations. Lateral suborbital ridge with 1 preorbital spine and 6–9 spines from below eye to (and including) the preopercular spine. Two to four little points on margin below preopercular spine. One subopercular spine. Operculum with 2 smooth ridges ending in spines. Three postorbital and one to two scapular spines on each side; and a pair of occipital spines. A spine above the axil. D X–XI+I 9, longest spine about $1\frac{1}{4}$ times diameter of eye. A III 5. P 19, $\frac{3}{5}$ length of head. Caudal subtruncate. Scales moderate: l.l. 40–43.

Length.—Up to 240 mm.

Colour.—Bright red.

Locality.—Natal coast, 120–220 fathoms.

Type in British Museum, topotypes in South African Museum.

The arrangement of the suborbital and preopercular spines is subject to considerable variation.

Fam. 7. Hoplichthyidae.

Body elongate, tapering, depressed. Head strongly depressed, upper surface and sides bony. Skin naked, except for a row of bony scutes along the upper part of each side. Two nostrils on each side. Gill-membranes attached to isthmus. Jaws, vomer, and palatine with minute teeth. Pseudobranchiae present. Two dorsal fins, the soft dorsal much longer than spinous. Anal long, without spines. Pectorals

large, with the lower 3–4 rays detached. Ventrals in front of bases of pectorals, moderately far apart, with 1 spine and 5 rays. Caudal separate, truncate. No air-bladder.

This family comprises a single genus of Indo-Pacific marine fishes, having an external likeness to the *Platycephalidae.*

Gen. Hoplichthys C. and V.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 264.

With the characters of the family.

Hoplichthys acanthopleurus Regan.

1908. Regan, Tr. Linn. Soc. Lond., Zool., vol. xii, pt. 3, p. 239, pl. xxviii, fig. 5.

1914. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xiii, pt. 5, p. 74 (*langsdorfi* non Cuv. and Val.).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 413 (*langsdorfi* non Cuv. and Val.).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

? 1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 78 (*citrinus* non Gilbert).

Length of head 3 (young)–3½, width across preopercular spines 3¾–4, in length of body. Eye 3⅔ in length of head, slightly less than snout. Maxilla extending to below anterior margin of eye. Ridges of head denticulate, lateral margins not strongly indented, spinose ; a patch of spines behind angle of jaws ; 12 gill-rakers on lower part of anterior arch. D VI+15, spinous dorsal scarcely higher in ♂ than ♀, spines not produced ; soft dorsal in ♂ with all the rays produced into filaments, the 3rd, 7th, and 8th being nearly as long as head. A 17. P 13+3, the detached rays about as long as the ventrals. Lateral scutes 27, each with a strong spine and 1–2 small ones below it. (Plate XXXIV, fig. 4.)

Length.—Up to 180 mm.

Colour (as preserved).—Pale brownish, a dark blotch on spinous dorsal.

Locality.—Coast of Natal and Zululand, 60–150 fathoms.

Distribution.—Seychelles, 123 fathoms.

It is probable that the specimen named *H. citrinus* by Gilchrist should be referred to the present species. *H. citrinus* Gilbert differs in having the 1st dorsal spine and only the first 4 soft rays in the ♂ produced into filaments.

Fam. 8. Triglidae.

Gurnards ; Knorhaan.

Body elongate, covered with scales or bony plates. Head completely cuirassed, usually with more or less prominent spines. Two nostrils on each side. Nuchal shield more or less produced backwards. Mouth terminal or inferior. Teeth small, in bands in jaws and usually on vomer and palatine ; or absent altogether. Gill-membranes free from isthmus. Pseudobranchiae present. Three pairs of dentigerous upper pharyngeals. Spinous dorsal shorter than soft. Anal with one pungent spine or none. Pectorals moderate or large, with 2–3 lower rays detached. Ventrals widely separated, with 1 spine and 5 rays. Air-bladder present. Pyloric caeca usually present, few in number.

Marine fishes from warm and temperate seas, in shallow or deep water. Easily distinguished by the mailed head and the large pectorals with their finger-like lower rays. These are used as feelers in searching under stones, etc. for the Crustacea and other animals on which these fishes live. The Dutch name is given to these fishes on account of the grunting noise they make.

Gurnards are well-known food-fishes.

Key to the South African genera.

I. Body covered with scales (*Triglinae*).
  A. Scales relatively large, 50–65 in the lateral line . . *Lepidotrigla.*
  B. Scales very small, 80 to more than 100 in the lateral line.
    1. Lateral line unarmed . . . . . *Chelidonichthys.*
    2. Lateral line spinose . . . . . *Trigla.*
II. Body covered with spinate bony plates (*Peristediinae*) . . *Peristedion.*

Gen. Lepidotrigla Gnthr.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 196.

1918. Fage, Dan. Ocean. Exp., vol. ii, A 3, p. 117 (post-larval stages).

Body covered with scales of moderate size. Three free pectoral rays. No teeth on palatines. A row of spinose plates along base of spinous and soft dorsal fins. Lateral line unarmed.

Mediterranean and Indo-Pacific.

Lepidotrigla faurei G. and T.

Large-scaled Gurnard.

1914. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xiii, pt. 3, p. 75.

1914. *Id.*, *ibid.*, p. 76 (*natalensis*).

PLATE XXXV.

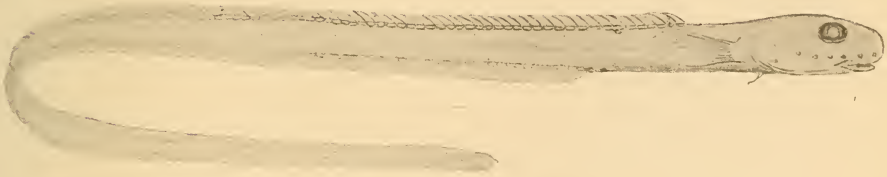
FIG.		TEXT-PAGE
1.	*Blennius cornutus* (Linn.) (original photo)	833
2.	*Clinus robustus* G. and T. (original photo)	860
3.	*Lycodonus vermiformis* n. sp. (original)	873
4.	*Selachophidium guentheri* Gilch. (after Gilchrist)	876
5.	*Genypterus capensis* (Smth.) (after Smith)	887
6.	*Fierasfer gracilis* Blkr. (original, but after Fowler)	886



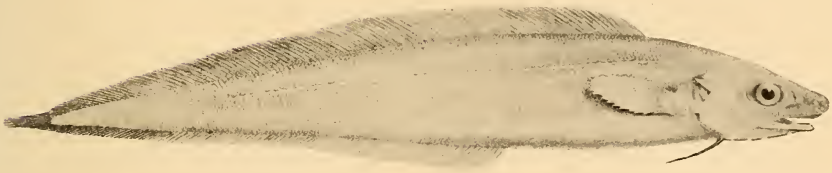
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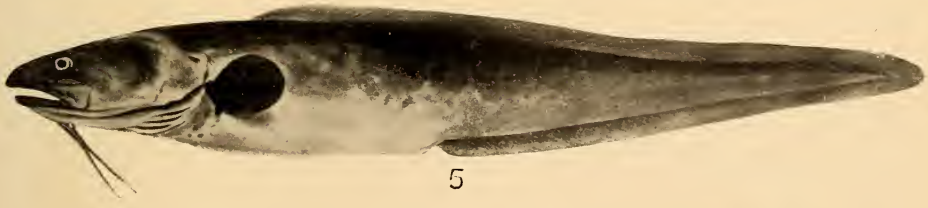
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4



5



6

Neill & Co., Ltd.

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 414.

Depth $4\frac{1}{4}$–$4\frac{3}{4}$, length of head $3\frac{1}{4}$–$3\frac{1}{2}$, in length of body. Eye 3–$3\frac{1}{4}$ in length of head, slightly longer than snout (excluding preorbital spines), $1\frac{1}{2}$ times the interorbital width. Snout slightly concave between the projecting preorbitals, each of which is armed with 3 (young)–5 spines, the outermost the strongest. Profile of snout straight or slightly concave. Interorbital space deeply concave. Two inconspicuous spines on supero-anterior margin of orbit. A short deep groove behind each orbit. Nuchal spines reaching to below base of 3rd dorsal spine. D VIII+15–17, 3rd spine longest, 1st and 2nd serrulate. A 15–16. Pectoral reaching to anterior third of soft dorsal, longest free ray reaching to tip of ventral. Ventral reaching to 2nd or 3rd ray of anal. Caudal truncate. Scales: l.l. 58–62. Twenty-three to twenty-five spines along base of dorsal. Breast naked. Gill-rakers 8 (excluding rudimentary ones at lower end). Pyloric caeca 7–8.

Length.—Up to 180 mm.

Colour (as preserved).—Greyish, no trace of dark spot on spinous dorsal, pectoral dark. Probably reddish in life.

Locality.—Coast of Natal and Zululand, 40–65 fathoms.

Types of *faurei* and *natalensis* in South African Museum.

L. natalensis is clearly the same species; there are several inaccuracies in the original description.

This species seems most closely allied to the Japanese *L. abyssalis* J. and S., differing in the preorbital spines and the relative lengths of 2nd and 3rd dorsal spines.

Gen. Chelidonichthys Kaup.

1873. Kaup, Archiv. f. Naturg., p. 87.

Body covered with small or very small scales. Three free pectoral rays. No teeth on palatines. A row of spinose plates along base of spinous and soft dorsal fins. Lateral line unarmed, without elongated shields, usually bifurcating at base of tail.

European, African, Japanese, and Australasian seas.

Key to the South African species.

1. Preorbital ending in several spines. Breast naked.
   - *a.* Eye about equal to interorbital width . . . . . *capensis.*
   - *b.* Eye distinctly greater than interorbital width . . . *kumu.*
2. Preorbital ending in a single spine. Breast pitted . . . *queketti.*

Chelidonichthys capensis (C. and V.).

Red Gurnard ; Roode Knorhaan.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 55.

1861. Castelnau, Mem. Poiss. l'Afr. Austr., p. 6 (*Prionotus pusillus*).

1904. Gilchrist, Mar. Invest. S. Afr., vol. ii, p. 190, pl. i, figs. 14, 15 (egg, larva) (*kumu* non Less.).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 413 (references).

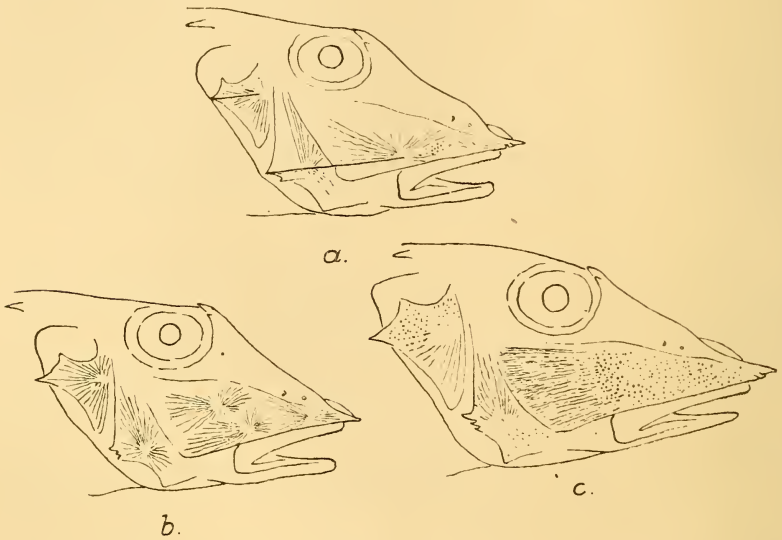


Fig. 28.—Diagrams of heads of *Chelidonichthys* to show sculpturing on preorbital and opercular bones ; fine lines represent lines of granules, dots represent irregularly arranged granules. a, *kumu* ; b, *queketti* ; c, *capensis*.

1918. Thompson, Mar. Biol. Rep., vol. iv., p. 141 (references).

1919. Gilchrist, Tr. Roy. Soc. S. Afr., vol. viii, p. 3, pl. i, figs. 1, 2 ; pl. ii, fig. 3 (egg, larva) (*kumu* non Less.).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 256.

(Non *capensis* Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xiii, pt. 3, p. 77).

Depth 5–5$\frac{1}{4}$, length of head 3–3$\frac{1}{4}$, in length of body. Eye 2$\frac{1}{5}$–2$\frac{1}{3}$ in snout, 4$\frac{3}{4}$–5 in length of head, almost or quite equal to interorbital width. Profile of snout straight. Front of snout concave between the preorbitals, each of which bears 5–6 spines, the middle ones strongest. Interorbital space gently concave or almost flat. Two spines on supero-anterior margin of orbit. Preorbital without any

keel, irregularly granular in front, the granules posteriorly arranged in gently radiating lines with smooth interspaces. Nuchal spines reaching to level of 1st dorsal spine. D VIII–IX+15–16, 2nd spine longest, 1st scarcely roughened. A 15–16. Pectoral reaching to middle of soft dorsal, longest free ray not reaching quite to tip of ventral, which reaches to vent. Caudal emarginate. Scales very small. Twenty-four spines along base of dorsal. Breast naked. Gill-rakers 16 (excluding rudimentary ones). Pyloric caeca 9. (Plate XXXIV, fig. 3.)

Length.—Up to 550 mm.

Colour.—Reddish or greyish, lower half of body silvery white; young frequently with a yellowish lateral tint; spinous dorsal, anal, ventrals, and caudal reddish; soft dorsal pink along base and margin; pectoral on outer side blackish, the ribs of the rays white; on inside bronzy-green, with a black oval patch containing several oval white blue-edged spots.

Locality.—Table Bay, Agulhas Bank to Natal, 5–50 fathoms.

Steindachner (SB. Ak. Wiss. Wien, vol. lvi, p. 683, 1867) considers that *capensis* is identical with the European species *lucerna* Linn.; but Smitt's (Skand. Fish., p. 200, fig. 57) description and figure of the latter species certainly does not apply to the Cape species.

Castelnau's "*Prionotus pusillus*" would appear to have been a young specimen of this species.

Chelidonichthys kumu (L. and G.).

Grey Gurnard; Graauwe Knorhaan.

1826. Lesson and Garnot, Voy. Coquille, Poiss., p. 214, pl. xix.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 53 (*peronii* part).

1908. Jordan and Richardson, Proc. U.S. Nat. Mus., vol. xxxiii, p. 656 (references).

1914. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xiii, p. 76 (*natalensis*).

1914. *Id.*, *ibid.*, p. 77 (*capensis* non Cuv. and Val.).

1914. *Id.*, *ibid.*, p. 78 (*peroni*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 413.

1918. Thompson, Mar. Biol. Rep., vol. iv, pp. 141, 142 (*kumu* and *peronii*) (references).

1921. Waite, Rec. S. Austr. Mus., vol. ii, p. 178, fig. 294.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., vol. i, p. 33.

Depth 5–5$\frac{1}{4}$, length of head 3–3$\frac{1}{3}$, in length of body. Eye 1$\frac{1}{2}$–1$\frac{3}{4}$

in snout, $3\frac{3}{4}$–4 in length of head, $1\frac{1}{2}$ or nearly 2 times the interorbital width. Profile of snout straight. Front of snout concave between the preorbitals, each of which bears 4–5 inconspicuous subequal spines. Interorbital space concave. Two spines on supero-anterior margin of orbit. One (or two) very inconspicuous spine on posterior margin of orbit, with a shallow and very short cross furrow behind it. Preorbital with a low keel ending behind in the preopercular spine, lines of granules radiating from a point just behind the anterior spines, and a second set of lines of granules radiating forwards, upwards, and backwards from a point just above end of maxilla. Nuchal spines not quite reaching level of 1st dorsal spine. D IX+15–16, 2nd spine longest, 1st spine scarcely roughened. A 15–16. Pectoral scarcely reaching beyond anterior third of soft dorsal, longest free ray reaching to tip of ventral, which reaches to slightly beyond vent. Caudal emarginate. Scales very small. Twenty-three to twenty-five spines along base of dorsal. Breast naked. Gill-rakers 8–9 (excluding rudimentary ones). Pyloric caeca 6–7.

Length.—Up to 300 mm. (In Australia nearly 2 ft.)

Colour.—Grey, olivaceous, or reddish, silvery below; outside of pectoral dark, inside dark brown with an oval black patch containing white spots; caudal (at least in young) with a light cross-band. (The green specimen mentioned by Gilchrist and Thompson owes its colour to copper sulphate staining, and is not natural.)

Locality.—False Bay, Agulhas Bank to Natal and Zululand, down to 100 fathoms.

Distribution.—Australasia, China, Japan.

Type of *natalensis* in South African Museum.

Reynaud's Cape specimen, assigned by Cuvier and Valenciennes to their species *peronii*, was probably a specimen of *kumu*.

Trigla natalensis G. and T. seems to be merely an aberration of this species, distinguished by the unusually large eye, $3\frac{1}{2}$ in length of head. The tubercular or nodular character of the first 6 dorsal spines is evidently due to healing after fracture.

I have compared Australian examples with South African ones and find them specifically identical.

Chelidonichthys queketti (Regan).

Quekett's Gurnard.

1904. Regan, Ann. Mag. Nat. Hist., (7), vol. xiv, p. 128.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 414.

Depth 5–5$\frac{1}{5}$, length of head 3$\frac{1}{3}$–3$\frac{1}{2}$, in length of body. Eye 1$\frac{1}{2}$–1$\frac{2}{3}$ in snout, 3$\frac{1}{2}$–3$\frac{2}{3}$ in length of head, 1$\frac{1}{3}$ times the interorbital width. Profile of snout straight. Front of snout concave between the preorbitals, each of which bears a single strong spine, with sometimes a smaller one internally. Interorbital space concave. Two (or three) spines on supero-anterior margin of orbit. No postorbital spine or groove ; a low but well-marked temporal ridge. Preorbital without keel, with 3 series of radiating lines of granules, one anteriorly, one above end of maxilla, and another between the latter and the eye. Nuchal spines reaching to level of 1st dorsal spine. D IX+18, 2nd spine longest, 1st almost smooth. A 17. Pectoral reaching to 3rd or 4th soft dorsal ray ; longest free ray reaching to posterior third or quarter of the ventral, which reaches to origin of anal. Caudal feebly emarginate. Scales small : l.l. about 80. Twenty-six to twenty-seven spines along base of dorsal fin. Breast more or less scaly. Gill-rakers 10–11 (excluding rudimentary ones). Pyloric caeca 8–9.

Length.—Up to 300 mm.

Colour.—Red, with yellow vermiculations, silvery below, pectoral fins pinkish on outer side, olive-green on inner side, with the membrane between the innermost 4 rays pinkish, other fins reddish, soft dorsal pink along base and margin.

Locality.—False Bay, Agulhas Bank, Natal coast ; occasionally caught in Table Bay.

Type in the British Museum.

Gen. Trigla Art.

1738. Artedi, Gen. Pisc., p. 42.

1918. Fage, Dan. Ocean. Exp., vol. ii, A 3, p. 114 (post-larval stages).

Body covered with moderately or very small scales. Three free pectoral rays. No teeth on palatines. A row of spinose plates along base of spinous and soft dorsal fins. Lateral line armed with a series of bony plates, each bearing a crest or a spine.

Europe and Africa.

Trigla lineata (Gmel.).

1785. Bloch, Syst. Ichth., pl. cccliv.

1788. Gmelin, Linné, Syst. Nat., vol. i, p. 1345.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 200.

Depth 4$\frac{4}{5}$–5, length of head 3$\frac{1}{2}$–3$\frac{2}{3}$, in length of body. Eye 1$\frac{1}{2}$–1$\frac{2}{3}$

in snout, 4 in length of head, 1½ times the interorbital width. Profile of snout slightly concave, descending very abruptly from top of head. Front of snout rounded, preorbitals without spines. Interorbital space concave. Three spines on supero-anterior margin of orbit. No postorbital spine or furrow. Preorbital without keel, with 3 series of radiating lines of granules, one anteriorly, one above end of maxilla, and the third between the latter and the orbit. Preopercular spine feeble. Nuchal spines reaching to level of 1st dorsal spine. Vomerine teeth absent. D X+15–17, 2nd spine longest, 1st slightly roughened. A 16–17. Pectoral reaching to anterior third of soft dorsal, longest free ray reaching to posterior quarter of ventral, which reaches to 3rd or 4th anal ray. Scales moderately small, the skin raised into vertical folds between the rows of scales : l.l. about 68–70, larger than the other scales, each bearing a spinose keel. Twenty-four to twenty-five spines along base of spinous and soft dorsal fins. Breast and throat more or less scaly. Gill-rakers 7 (excluding rudimentary ones). Pyloric caeca 8–10.

Length.—Up to 230 mm.

Colour.—Red, mottled with darker red or brownish, silvery below ; spinous and soft dorsal mottled ; caudal mottled, especially on upper margin ; anal white along base and margin, with a pink band between ; ventral pink ; pectoral on outside mottled and barred, the free rays also barred, on inside olivaceous, with an ultramarine-blue border and large oval spots, membrane between the innermost 3 rays pink.

Locality.—Agulhas Bank, Algoa Bay, 20–40 fathoms.

Distribution.—South-west coast of Europe, Mediterranean, Madeira.

Gen. Peristedion Lacép.

1802. Lacépède, Hist. Nat. Poiss., vol. iii, p. 368.

1859. Kaup, Proc. Zool. Soc. Lond., p. 103 (*Peristethus*).

1913. Weber, Siboga Exp. Monogr. 57, p. 511 (synopsis of Indo-Pacific species).

Body covered with bony plates, each of which is armed with a spine. Two free pectoral rays. Each preorbital produced in a long flat process over the mouth, which is inferior. The outstanding keel of the preorbital continued backwards to the strong preopercular spine. Teeth absent. Spinous and soft dorsal more or less separate. Lower jaw with barbels.

Deep-sea Gurnards from the tropical and sub-tropical regions.

Key to the South African species.

1. Forehead with a median spine. Dorsal with 14 rays . . . *adeni.*
2. Forehead without a spine. Dorsal with 20 rays . . . . *gracile.*

Peristedion adeni (Lloyd).

1907. Lloyd, Rec. Ind. Mus., vol. i, pt. 1, p. 8.
1908. Illustr. Zool. Investig. Fishes, pl. xliii, figs. 1, 1*a*.
1921. Regan, Ann. Mag. Nat. Hist., (9), vol. vii, p. 412.
1922. Gilchrist, Fish. Mar. Surv. Spec. Rep., iii, p. 78.
1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 256.

Depth 5, length of head $2\frac{1}{6}$–$2\frac{1}{2}$, in length of body (rostral projections excluded in each case). Eye $2\frac{2}{3}$ in snout, 5 in length of head, equal to interorbital width. Preorbital (rostral) processes subparallel, the outer margins converging, length $\frac{1}{3}$ distance from their apices to anterior border of orbit. Preorbital ridge nearly straight, finely serrulate, ending in the preopercular spine, whose (free) length is equal to $\frac{2}{3}$ orbit. A pair of nasal spines. A single median spine on forehead. One antorbital and one postorbital spine. Occipital, temporal, and opercular spines. D VII–VIII 14. A 14–15. Barbels fringed, the longest equal to width of mouth. Gill-rakers 14 on lower part of anterior arch (excluding 3–4 rudimentary ones). Greatest length of each anterior ventral plate equal to (or almost) combined breadth of both plates ; greatest length of posterior ventral plates half (or a little more) that of anterior plates. Body with 4 rows of plates on each side, each with a single recurved spine, those on the 2 ventral rows less conspicuous than the others ; l.l. 24–25 (counting from the bare skin around base of pectoral, but not including 5 additional spinose plates around the opercular flap).

Length.—Up to 220 mm.

Colour.—Reddish, dorsal tipped with black.

Locality.—Natal coast, 33–207 fathoms.

Distribution.—Gulf of Aden, 130 fathoms.

**Peristedion gracile* G. and B.

1896. Goode and Bean, Oceanic Ichthyol., p. 473, fig. 387.
1924. Gilchrist and von Bonde, Fish. Mar. Surv. Spec. Rep., iii, p. 22.

Depth nearly 6, length of head nearly 3, in length of body (rostral processes excluded in all cases). Eye about equal to interorbital space, $\frac{1}{2}$ length of snout, $3\frac{3}{4}$ in length of head. Preorbital processes elongate, nearly $\frac{1}{2}$ distance from their apices to anterior margin of orbit.

Preorbital ridge ending in a blunt preopercular spine. No spine on forehead. No nasal or antorbital spines. Postorbital, small occipital, temporal, and opercular spines. D VIII 20. A 19. Barbels fringed, the longest equal to diameter of eye. Gill-rakers 27. Body with 4 rows of plates on each side, each bearing a recurved spine; l.l. 30.

Length.—Up to 125 mm.

Colour.—Yellowish, darker above, pectorals mottled.

Locality.—Off Delagoa Bay, 260 fathoms.

Distribution.—Gulf of Mexico.

The identification of the East African specimens with a Mexican species seems a little doubtful, especially as there are already 16 other species, besides *P. adeni*, recorded from the Indo-Pacific region. It seems to me that there is far more likelihood of these specimens being identical with *P. orientale* Temm. and Schl.

Fam. 9. Dactylopteridae.

Flying Gurnards.

Body elongate, subquadrangular. Head blunt, completely cuirassed. Preopercle produced in a long spine. Nuchal shield produced backwards on either side of front part of dorsal fin as a bony plate. Scales bony, strongly keeled; small scales on cheeks and opercles. Two knife-like scales on either side of base of tail. Lower jaw included in upper, mouth small. Teeth granular on jaws, none on vomer or palatine. Gill-membranes free from isthmus. Two nostrils on each side. Pseudobranchiae large. Gill-rakers minute. Dorsal of two parts, the spinous part preceded by 1 or 2 long flexible free spines. Second dorsal and anal short, the latter without spines. Pectorals very large in adult, inserted horizontally, with about 6 anterior rays, short and almost completely divided from rest of fin. Ventrals narrowly separated, with 1 spine and 4 rays. Caudal lunate. Air-bladder divided into two lateral parts. Pyloric caeca numerous.

The Flying Gurnards form a small but distinctive family represented in the warm parts of the Atlantic and Indo-Pacific Oceans by four genera. In habits they resemble the Flying-fish, but do not fly for such long distances, and unlike the Flying-fish vibrate the pectoral fins. They also to a large extent frequent the bottom, where they have been observed, in aquaria, to scratch up the ground in search of food with the short anterior part of the pectoral fins.

The young forms, known as *Cephalacanthus*, have short pectoral fins.

Gen. Dactyloptena J. and R.

1908. Jordan and Richardson, Proc. U.S. Nat. Mus., vol. xxxiii, p. 665.

No lateral line. One long and one short detached spine in front of spinous dorsal. Preorbitals not meeting in front on snout. The Atlantic genus, *Dactylopterus*, differs in having two semi-detached short rays which fold back on either side of spinous dorsal.

Dactyloptena orientalis (C. and V.).

Flying Gurnard.

1829. Cuvier and Valenciennes, Hist. Nat. Poiss., vol. iv, p. 134, pl. lxxvi.

1860. Günther, Cat. Fish. Brit. Mus., vol. ii, p. 222.

1878–88. Day, Fish. India, p. 279, pl. lx, fig. 6.

1908. Jordan and Richardson, *loc. cit.*, p. 666.

1913. Weber, Siboga Exp. Monogr. 57, pp. 516, 517, fig. 109 (young).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 33.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 256.

Depth $5\frac{1}{2}$–6, length of head (without preopercular spine) $3\frac{1}{2}$–$4\frac{1}{3}$, in length of body. Eye about equal to postorbital part of head, less than interorbital width. Scapular processes acute, reaching to 2nd dorsal spine, distance between their apices $1\frac{1}{3}$–$1\frac{1}{2}$ in the depth of the notch between them, which forms an acute angle. D I+I+V+8, 1st detached spine greatly elongate, 2nd half height of spinous dorsal. A short spine between spinous and soft dorsals. A 6–7. Pectorals reaching to or beyond base of caudal. Scales : l.r. ca. 47 ; l.tr. 21 ; 4 enlarged scales on lower posterior part of body. (Plate XXXVI, fig. 1.)

Length.—Up to 350 mm.

Colour.—Greyish-brown, with darker spots on back, whitish below, spinous dorsal and pectoral dark, the latter with blackish spots.

Locality.—East London, Natal coast, Delagoa Bay, down to 33 fathoms.

Distribution.—Indo-Pacific.

Division 20. PLECTOGNATHI.

(1902. Regan, Proc. Zool. Soc. Lond., vol. ii, p. 284, classification).

Air-bladder without open duct (physoclystic). No mesocoracoid. Opercular bones more or less reduced. Gill-opening much reduced.

Maxilla and premaxilla often firmly united. Pectoral arch suspended from the skull. Pelvic bones, if present, more or less fused. No ribs. Spinous dorsal present or absent. Ventrals, if present, thoracic, reduced. Jaws strong, teeth separate or united into a beak. Skin naked or with osseous scales, scutes, or spines.

This division includes the easily recognisable Trigger-fishes, Box-fishes, Globe-fishes, and Sun-fishes. They are mostly tropical and sub-tropical marine fishes ; some are found in brackish water and estuaries.

Closely related to the *Teuthididae* (*Acanthuridae*) (Surgeon-fishes).

Following Regan and Boulenger, two groups are here recognised.

Key to the South African families.

I. Supraclavicle vertical. Spinous dorsal present or absent. Ventrals present or absent. Teeth separate or united (*Sclerodermi*).
  A. Spinous dorsal present.
    1. Ventral fins represented by a pair of spines . . *Triacanthidae.*
    2. Ventral fins represented by a single spine . . . *Balistidae.*
  B. Spinous dorsal and ventrals absent . . . . *Ostraciontidae.*

II. Supraclavicle oblique. Spinous dorsal and ventrals always absent. Teeth always united (*Gymnodontes*).
  A. Beak with a median suture. Body inflatable . . *Tetrodontidae.*
  B. Beak without median suture.
    1. Caudal fin present . . . . . *Diodontidae.*
    2. Caudal fin absent, the body truncate posteriorly . . *Molidae.*

Fam. 1. Triacanthidae.

Maxilla and premaxilla not fused. Teeth separate, conical or incisor-like. Spinous dorsal with 2–6 spines. Ventral fins each represented by a strong spine, with an inner basal knob which locks it when everted ; rarely with 1–2 rudimentary soft rays. Scales small, spinous or bony.

Key to the South African genera.

1. Dorsal spines 4–6. Mouth horizontal.
  a. Caudal peduncle long. Teeth incisor-like . . . [*Triacanthus*].
  b. Caudal peduncle short. Teeth conical . . . . *Triacanthodes.*
2. Dorsal spines 3. Mouth directed upwards . . . . [*Tydemania*].

Although not actually recorded from our region, the Indo-Pacific genera *Triacanthus* and *Tydemania* are included in the above key, as it is quite possible they may later be found here.

Gen. Triacanthodes Blkr.

1858. Bleeker, Act. Soc. Sci. Indo-Neerl., vol. iii, Japan, pt. 4, p. 37.

Body compressed. Caudal peduncle short. Scales small, spiny. No distinct lateral line. Dorsal spines 4–6. Ventrals usually with 1–2 rudimentary soft rays. Teeth conical, with a few forming an inner row. Eye large.

Indo-Pacific, in rather deep water.

Triacanthodes ethiops Alck.

1894. Alcock, J. Asiat. Soc. Beng., vol. lxiii, pt. 2, p. 137, pl. vii, fig. 6.

1895. Illustrat. Zool. Investigator, Fish., pl. xv, fig. 9.

1899. Alcock, Cat. Deep-sea Fish. Ind. Mus., p. 208.

Depth a little more than half length. D VI 14–16. A 14. P 12–13. V I 1. C 12. First dorsal spine rather shorter than ventral spine, which is $\frac{1}{3}$ length of body. All the spines rough. (Plate XXXVI, fig. 2.)

Length.—Up to 85 mm.

Colour.—Mottled black and white, young blue-black (Alcock).

Locality.—Natal coast, 100 fathoms.

Distribution.—Indian seas, 145–250 fathoms.

A young specimen, 21 mm. long, is assigned to this species. The snout is not so pronounced as in Alcock's figure, the depth is $\frac{2}{3}$ the length, the ventral spine is only about as long as the 1st dorsal spine, and $3\frac{1}{2}$ in length.

Fam. 2. Balistidae.

Trigger-fishes.

Maxilla and premaxilla fused. Teeth separate, incisor-like. Spinous dorsal with 1–3 spines. Ventrals, if present, represented by a single short rough spine. Skin covered with movable scutes or small rough scales.

The Trigger-fishes and File-fishes are abundant in all warm seas, especially among coral-reefs. Their strong dentition enables them to feed on corals and hard-shelled molluscs. They are mostly brightly coloured, and the flesh of many of them poisonous. The name "Trigger-fish" has been given on account of the peculiar mechanism of the dorsal spines. When the 1st spine is erected it is locked in position by the 2nd spine, and cannot be depressed by external force. The species of *Monacanthus* are more properly called "File-fishes," the rough and slender 1st dorsal spine resembling that tool; their tough skin has been responsible for the name "Leather-jacket."

Key to the South African genera.

I. Spinous dorsal of 3 spines. Scales rather large, bony, forming a coat of mail (*Balistinae*).
  A. Gill-opening with enlarged scutes behind it.
    1. A groove in front of eye . . . . . *Balistes.*
    2. No groove in front of eye . . . . . *Balistapus.*
  B. No enlarged scutes behind gill-opening . . *Canthidermis.*

II. Spinous dorsal of a single spine. Scales minute, spinose, the skin more or less velvety (*Monacanthinae*).
  A. Ventral spine present.
    1. Ventral spine movable . . . . . *Monacanthus.*
    2. Ventral spine immovably fixed . . . . *Cantherines.*
  B. Ventral spine absent . . . . . *Alutera.*

Gen. Balistes Linn.

1758. Linné, Syst. Nat., ed. 10, p. 327.

1902. Regan, *loc. cit.*, p. 289.

1922. Jordan and Jordan, Mem. Carn. Mus., vol. x, p. 84.

Scales moderate or large, juxtaposed, bony, forming a coat of mail. Spinous dorsal of 3 (rarely 2) spines, the 1st very strong, the 2nd well developed, the 3rd, if present, remote from the first 2. Caudal rounded or truncate, the upper and lower rays often produced. Osseous scutes behind the gill-opening. A groove in front of eye. Lateral line more or less developed (usually visible only when scales are dry). Each jaw with usually a single series of incisor-like teeth.

Regan recognises only the one comprehensive genus *Balistes*.

Tropical and subtropical seas, shallow water.

Key to the South African species.

1. Caudal peduncle depressed (*Leiurus*) . . . . . *stellatus.*
2. Caudal peduncle compressed (*Sufflamen*).
  a. Caudal peduncle with recurved spines or tubercles.
    i. Caudal fin with white margins . . . . . *niger.*
    ii. A light stripe from mouth towards root of pectoral *capistratum.*
  b. Caudal peduncle without spines or tubercles . . . . *vetula.*

Balistes lineatus Bl. Schn. (=*undulatus* Park), *rectangulus* Bl. Schn., and *flavomarginatus* Rüpp. are recorded from Mozambique in Playfair and Günther (Fish. Zanz., pp. xiii and 134), but in Günther's Catalogue this locality is not given for these species.

Balistes stellatus Lacép.

Stellate Trigger-fish ; Varken-vis (Dutch East Indies).

1798. Lacépède, Hist. Nat. Poiss., vol. i, p. 350, pl. xv, fig. 1.
1865. Bleeker, Atlas Ichthyol., vol. v, p. 105, pl. ccxv.
1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 212.
1878–88. Day, Fish. India, p. 687, pl. clxxvii, fig. 1.

Depth about $2\frac{1}{3}$ in length. Caudal peduncle depressed, with two low granular ridges on either side. Teeth white, notched. D III+26–27 ; 2nd dorsal spine nearly as long as 1st. A 24–25. Soft dorsal and anal not produced. Caudal undulated, upper and lower lobes produced in long filaments in adult. Twenty-four series of scales between origin of soft dorsal and vent. Cheeks scaled. (Plate XXXVI, fig. 3.)

Length.—Up to 600 mm.

Colour.—Greyish or olive-green, with irregular bluish spots and 3 large white blotches on back ; spinous and soft dorsal, anal, and caudal fins banded ; pectoral, and some stripes from mouth towards base of pectoral, yellowish.

Locality.—Mossel Bay.

Distribution.—Indo-Pacific.

Balistes niger M. Park.

Black Trigger-fish.

1791. Mungo Park, Tr. Linn. Soc., vol. iii, p. 37.
1865. Bleeker, Atlas Ichthyol., vol. v, p. 115, pl. ccxvi, fig. 1 (*armatus*).
1878–88. Day, Fish. India, p. 688, pl. clxxxi, fig. 1.
1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 420 (references).

Depth about $1\frac{4}{5}$ in length. Caudal peduncle compressed, with 6–8 rows of recurved spines. Teeth white, notched. D III+26–28 ; 2nd dorsal spine considerably shorter than 1st. A 23–25. Soft dorsal and anal not elevated. Caudal truncate. Twenty-six series of scales between origin of soft dorsal and vent. Cheeks scaly.

Length.—Up to 300 mm.

Colour.—Brownish-black ; soft dorsal and anal, margins of caudal, and a ring around mouth light yellow or whitish.

Locality.—Natal coast.

Distribution.—Indo-Pacific.

Balistes capistratus Shaw.

Bridled Trigger-fish.

1804. Shaw, Gen. Zool., vol. v, p. 417.

1865. Bleeker, Atlas Ichthyol., vol. v, p. 114, pl. ccxxiii, fig. 2 (*frenatus*).

1878–88. Day, Fish. India, p. 689, pl. clxxvii, fig. 3 (*mitis*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 419.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 158 (references and synonymy).

Depth about $1\frac{3}{4}$–2 in length. Caudal peduncle compressed, with a small tubercle (often more or less obsolete) on each scale. Teeth white, notched. D III+29–31 ; 2nd spine $\frac{3}{4}$ length of 1st. A 26–28. Soft dorsal and anal not elevated. Caudal truncate. Thirty-four series of scales between origin of soft dorsal and vent. Cheeks scaly.

Length.—Up to 500 mm.

Colour.—Brownish, with a yellow ring around mouth and (usually) a yellow stripe from mouth towards base of pectoral (resembling a bridle).

Locality.—Natal coast.

Distribution.—Indo-Pacific.

**Balistes vetula* Linn.

Blue-banded Trigger-fish ; Old Wife.

1758. Linné, Syst. Nat., ed. 10, p. 329.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 157 (references).

Caudal peduncle compressed, without any spines or tubercles on the scales. D III+30–32. A 29. Anterior rays of soft dorsal and the caudal lobes produced into long filaments in adult. About 36 series of scales between origin of soft dorsal and vent. Cheeks scaly.

Length.—Up to 400 mm.

Colour.—Brownish ; two bluish, dark-edged bands on side of head ; a black line below eye and several other lines radiating from eye ; dorsal and anal fins with blue bands ; upper and lower margins of caudal and a cross-band near the posterior margin, blue.

Locality.—Cape seas.

Distribution.—Tropical Atlantic (W. Indies, Ascension, etc.), rare in Indian seas and East Indies.

Gen. Balistapus Til.

1820. Tilesius, Mem. Ac. Nat. Sci. Petersb., vol. vii, p. 302.

Resembling *Balistes*, but without a groove in front of eye, and lateral line quite obsolete.

Balistapus aculeatus (Linn.).

Spiny-tailed Trigger-fish.

1758. Linné, Syst. Nat., ed. 10, p. 328.

1865. Bleeker, Atlas Ichthyol., vol. v, p. 120, pl. ccxvi, fig. 3.

1878–88. Day, Fish. India, p. 690, pl. clxxviii, fig. 3.

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 414, pl. lxii.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 418 (references).

1921. Gilchrist, Tr. Roy. Soc. S. Afr., vol. x, pt. 1, pp. 24, 25 (sleep habits).

Depth about 2 in length. Caudal peduncle compressed, with $2\frac{1}{2}$ rows of strong, recurved spines. Teeth white, notched. D III+25; 2nd spine little more than $\frac{1}{2}$ length of 1st. A 22. Soft dorsal and anal rounded or undulate. Caudal truncate. Twenty-three series of scales between origin of soft dorsal and vent. Cheeks scaly.

Length.—Up to 250 mm.

Colour.—Greyish or yellowish, with a dark irregular patch on sides, with bands extending to soft dorsal and anal; 4 interocular bands, 3 between eye and pectoral, and a band over snout, blue; a yellow or orange stripe between mouth and pectoral; back with reddish, yellowish, or greenish tints; caudal spines black.

Locality.—Coast of Zululand and Portuguese East Africa.

Distribution.—Indo-Pacific, and coast of W. Africa.

This fish, according to Gilchrist, has the habit of going to sleep on its side at night-time. "If disturbed at night it was aroused with difficulty, and usually turned over on the other side and went to sleep again." (*Cf.* the Wrasse, p. 742.)

It is also known to produce a drumming sound by means of friction between the bones of the shoulder-girdle.

Gen. Canthidermis Swains.

1839. Swainson, Nat. Hist. Classif. Anim., vol. ii, p. 325.

Differs from *Balistes* in having no enlarged scales behind the gill-opening. The body is more elongate than in typical *Balistes*.

Key to the South African species.

1. 28–30 transverse series of scales . . . . . *maculatus.*
2. 18–19 transverse series of scales . . . . . *ringens.*

Canthidermis maculatus (Gmel.).

Blue- and White-spotted Trigger-fish.

1788. Gmelin in Linné, Syst. Nat., vol. i, p. 1468.

1865. Bleeker, Atlas Ichthyol., vol. v, p. 122, pl. ccxviii, fig. 4.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 159 (references and synonymy).

Depth about $2\frac{1}{2}$–$2\frac{3}{4}$ in length. Eye 3 in length of snout. Caudal peduncle compressed, without spines or tubercles. Teeth white, notched. D III+24–26. A 24–25. Soft dorsal and anal anteriorly elevated. Posterior margin of caudal undulate. Scales granulate, but without a median keel or spines; 28–30 series between origin of soft dorsal and anal. Cheeks scaly.

Length.—Up to 500 mm.

Colour.—Bluish-black, lighter beneath, spotted with numerous round pale-blue or white spots.

Locality.—False Bay, Jeffreys Bay, Mossel Bay.

Distribution.—Warm parts of Atlantic, Indian, and Pacific Oceans.

The above description is taken from the Cape specimens only, the largest being 355 mm. in length. The specimen figured by Day (Fish. India, p. 687, pl. clxxv, fig. 3) has the eye larger in proportion to the snout, and, according to Jordan and Evermann, should have been identified as *oculatus*.

**Canthidermis ringens* Linn.

1758. Linné, Syst. Nat., vol. i, p. 407.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 221.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 264.

Depth 2 in length. Caudal peduncle compressed, without spines or tubercles. D III+27–28. A 27–29. Anterior dorsal and anal and caudal lobes slightly produced. Eighteen to nineteen series of scales between dorsal and anal. Cheeks with 3 very distinct, naked, narrow, blackish longitudinal grooves.

Length.—Up to 250 mm.

Colour.—Brownish or greyish, darker above, each scale with a dark

spot, more or less confluent into longitudinal lines (Günther), fins pale, caudal with crescentic whitish patch.

Locality.—Natal coast.

Distribution.—West Indies, Mauritius.

Gen. Monacanthus Cuv.

1817. Cuvier, Règne Anim., ed 1, p. 152.

1861. Gill, Proc. Ac. Nat. Sci. Philad., p. 78 (*Stephanolepis*).

Scales small, rough with granules or spinules. Spinous dorsal of a single strong spine, often with a rudimentary 2nd one. Ventral spine movable. Caudal rounded. Teeth incisor-like, in 2 rows in upper, in a single row in lower, jaw.

Tropical and subtropical seas, shallow water.

Key to the South African species.

1. Depth not twice in length.
   - *a.* No black spot on gill-opening. Dorsal spine above hind margin of eye *setifer.*
   - *b.* A black spot on gill-opening. Dorsal spine above middle of eye *melanocephalus.*
2. Depth at least twice in length . . . . . *oblongus.*

Monacanthus setifer Benn.

File-fish.

1830. Bennett, Proc. Zool. Soc., p. 112.

1846. Schlegel, Fauna Jap. Poiss., p. 290, pl. cxxx, fig. 1 (*cirrhifer*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 422 (references and synonymy).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 161.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 37.

Depth more than $\frac{1}{2}$ length of body. Eye 3 in snout. D I+29–34. Spine above or immediately behind hind margin of eye, rough in front, with a double row of barbs behind. Soft dorsal elevated anteriorly, 2nd ray sometimes filamentous. A 29–33.

Length.—Up to 250 mm.

Colour.—Brownish, with indistinct dark longitudinal bars on sides and spots on head and belly, edges of fins pale, caudal with cross-bars.

Locality.—Port Elizabeth to Natal and Zululand, down to 33 fathoms.

Distribution.—Tropical Atlantic and Indo-Pacific.

**Monacanthus melanocephalus* Blkr.

Black-spot File-fish.

1853. Bleeker, Nat. Tyds. Ned. Ind., vol. v, p. 95.

1865. *Id.*, Atlas Ichthyol., vol. v, p. 127, pl. ccxxiii, fig. 1.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 242.

1919. Regan, Ann. Durban Mus., vol. ii, pt. 4, p. 203.

Depth about half the length. Eye $2\frac{1}{2}$ in snout. D I+31–32. Spine above the middle of eye, strong, as long as head, rough in front and barbed behind. A 26–28. Soft dorsal and anal not elevated. Caudal rounded. Ventral spine prominent.

Length.—Up to 90 mm.

Colour.—Brownish, a black spot on the gill-opening; dorsal and anal fins dotted with black; caudal with interrupted dark cross-bars.

Locality.—Natal coast.

Distribution.—East Indies.

Monacanthus oblongus Schleg.

Oblong File-fish.

1846. Schlegel, Fauna Jap. Poiss., p. 291, pl. cxxx, fig. 2.

1855. Bianconi, Mem. Ac. Sci. Inst. Bonon., vol. vi, p. 148, pl. iii, fig. 2 (*bertoloni*).

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 241.

1902. Jordan and Fowler, Proc. U.S. Nat. Mus., vol. xxv (1903), p. 266, fig. 2.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 264 (*choirocephalus* ? non Blkr.).

Depth a little less than half the length. Eye 3 in snout. D I+25–28. Spine often rather feeble, rough in front, barbed behind, situate above posterior part of eye. A 25–29. Soft dorsal and anal elevated anteriorly. Caudal rounded, but with the middle rays rather long and sometimes filamentous. Ventral spine moderate.

Length.—Up to 112 mm.

Colour.—Brown, marbled with darker blotches and spots on back, sides, and belly; faint dark bars across snout, interorbital, and throat; membrane of dorsal spine black; anterior rays and usually the base and the outer margin of soft dorsal and anal suffused with black; caudal with 3 irregular and interrupted dark cross-bars.

Locality.—Coast of Natal and Portuguese East Africa.

Distribution—Indo-Pacific.

Gen. Cantherines Swains.

1839. Swainson, Nat. Hist. Fish., vol. ii, p. 327.

1866. Bleeker, Ned. Tydsskr. Dierk., vol. iii, p. 11 (*Pseudomonacanthus*).

1925. Jordan, Proc. U.S. Nat. Mus., vol. lxvi, p. 39.

Differs from *Monacanthus* in having the ventral spine immovably fixed. The barbs on the dorsal spine, if present, are usually in four series.

Key to the South African species.

1. Dorsal spine with 4 equidistant series of strong barbs . . . *peroni.*
2. Dorsal spine with 2 posterior rows of barbs.
   a. Soft dorsal and anal anteriorly elevated. Skin velvety *modestoides* n. sp.
   b. Soft dorsal and anal low. Skin rough, scales distinct . *arenaceus* n. sp.
3. Dorsal spine rough, without barbs . . . . . *sandwichiensis.*

Cantherines peroni (Holl.).

Tooth-brush File-fish.

1854. Holland, Ann. Sci. Nat., vol. ii, p. 356, pl. xiii, fig. 4.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 249.

Skin with papillae, each with a round expansion at the top like a mushroom; when dry, these papillae shrink and become spine-like. Adult males with a band of long, slender, stiff bristles like a tooth-brush, on each side of tail, midway between posterior half of soft dorsal and anal. Depth $2\frac{1}{3}$–$2\frac{1}{2}$ in length. Eye 3 in snout, the upper profile of which is slightly concave. D I+33–35. Spine above middle of orbit, with 4 equidistant series of barbs, not exceeding half length of head. A 32–33. Soft dorsal and anal low. Ventral spine not prominent.

Length.—Up to 250 mm.

Colour.—Uniform brown or with small spots. (Waite, Rec. S. Austr. Mus., vol. ii, pt. 1, 1921, p. 187, figures a specimen with black cross-bands).

Locality.—Natal coast.

Distribution.—Southern Australia.

The single specimen in the South African Museum is a very old one which has been dried, and whose locality may be doubtful.

Three small specimens, up to 70 mm. in length, may be the young of this species. They possess the mushroom-like papillae on the skin, but the dorsal spine is not distinctly 4-angled.

Cantherines modestoides n. sp.

Brown File-fish.

Skin minutely granular, soft and velvety. Depth 2 (back to ventral spine), ($2\frac{3}{4}$ between origins of soft dorsal and anal) in length. Eye 3 in snout, whose dorsal profile is straight or very slightly convex. D I+37. Spine $\frac{2}{3}$ length of head, situate above middle of orbit, rough in front, posterior margins with a series of laterally projecting small barbs. A 36. Soft dorsal and anal anteriorly elevated. Ventral spine small, but well marked. Caudal peduncle slightly longer than half length of snout. Caudal fin rounded.

Length.—210 mm.

Colour (as preserved).—Uniform grey-brown.

Locality.—Algoa Bay.

Type in South African Museum.

This species seems most nearly allied to *modestus* (Gnthr.), but has a larger eye and deeper body (at the level of the ventral spine).

Cantherines arenaceus n. sp.

Rough-skinned File-fish.

Skin with distinct scales, each of which is granulate or spinulose, the surface therefore rough. Depth a little over 2 (back to ventral spine), ($2\frac{1}{2}$ between origins of soft dorsal and anal) in length. Eye $3\frac{1}{2}$ in snout, whose upper profile is straight or very slightly concave. D I+32. Spine (broken) apparently about $\frac{2}{3}$ length of head, situate above middle of orbit, rough in front, posterior margins with a series of laterally projecting small barbs. A 30. Soft dorsal and anal low. Ventral spine well marked. Caudal peduncle rather longer than half length of snout. Caudal fin rounded.

Length.—230 mm.

Colour (as preserved).—Uniform brown.

Locality.—South African seas (exact locality lost, probably Natal).

Type in South African Museum.

The character of the skin distinguishes this species from all the other South African species. It appears to be allied to *trachylepis* (Gnthr.), but has fewer rays in the soft dorsal and anal.

Cantherines sandwichiensis (Q. and G.).

Reticulate or Yellow-finned File-fish.

1824. Quoy and Gaimard, Voy. Uranie, Zool., p. 214.

1855. Rüppell, Neue Wirbel. Fische, p. 57, pl. xv, fig. 3 (*pardalis*).

1865. Bleeker, Atlas Ichthyol., vol. v, p. 136, pl. ccxxx, fig. 2, (*pardalis*).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 418, fig. 183.

1911. Gilchrist and Thompson, Ann. S. Afr. Mus., vol. xi, pt. 2, p. 48 (*natalensis*).

1917. *Id.*, Ann. Durban Mus., vol. i, pt. 4, p. 422 (*pardalis*) (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 160 (*pardalis*) (references).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 264 (*pardalis*).

Skin with more or less distinct scales, rough, sandpapery. Sides of caudal peduncle with short bristle-like setae, and in adult male 2 pairs of strong recurved spines. Depth about $1\frac{4}{5}$ (back to ventral spine), ($2–2\frac{1}{4}$ between origins of soft dorsal and anal) in length. Eye about $3\frac{1}{2}$ in snout, whose dorsal profile is slightly concave. D I+34–36; spine rather long, nearly equal to length of snout, rough, without any well-marked barbs, situate above anterior part of orbit. A 30–31. Soft dorsal and anal not elevated. Ventral spine well marked. Caudal rounded. Caudal peduncle only a little longer than diameter of eye.

Length.—Up to 330 mm.

Colour.—Dark brown or brownish-black, lips light, sometimes with darker or light spots; a network of light lines over body and whitish or bluish stripes from mouth to hind part of head; fins yellowish or orange; the young more or less shining silvery.

Locality.—Coast of Natal and Portuguese East Africa.

Distribution.—Tropical Atlantic and Indo-Pacific.

Type of *natalensis* in South African Museum.

C. pardalis is usually regarded as a variety, and is characterised by the network of light lines on the body and the light stripes on head. Most of the Natal specimens seem to be more or less uniform in colour.

C. natalensis is an abnormal specimen in which the distance between ventral spine and anal is considerably smaller than usual. There is, however, an intermediate specimen in the collection. The statement that the dorsal spine has a "series of barbs on each side pointing

outward and upward" is misleading; these "barbs" are merely well-developed granules such as are found on typical specimens.

Gen. Alutera Cuv.

1817. Cuvier, Règne Anim., ed 1, p. 153.

1896. Jordan and Evermann, Check-list Fishes, p. 424 (*Osbeckia*).

Dorsal spine feeble, above the orbit. Ventral spine absent. Soft dorsal and anal with numerous (45–50) rays. Caudal subtruncate or rounded. Lower jaw projecting. Body very compressed.

Osbeckia is differentiated by the much longer caudal, and concave profile of snout. It seems, however, scarcely worthy of even subgeneric rank.

Key to the South African species.

1. Caudal fin shorter than head. Upper profile of snout convex . *monoceros.*
2. Caudal fin longer than head. Upper profile of snout concave . *scripta.*

Alutera monoceros (Osb.).

Unicorn Fish.

1757. Osbeck, Iter Chinensis, p. 110.

1878–88. Day, Fish. India, p. 693, pl. clxxix, fig. 2.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 421 (references and synonyms).

Skin velvety. Body oblong. Head deep. Snout moderate, upper profile convex. Eye small, 5–5½ in snout. D I+45–50; spine feeble, not more than ½ length of snout, roughened, but without barbs. A 48–53. Soft dorsal and anal slightly higher in front than posteriorly. Caudal fin less than length of head, subtruncate.

Length.—Up to 600 mm.

Colour.—Grey-brown or olivaceous, uniform or with obscure darker mottling; fins pale.

Locality.—Natal coast. There is also a specimen in the South African Museum said to have come from Table Bay; it was brought to the Museum in a fresh state, and must have come either from Table Bay or False Bay.

Distribution.—Tropical Atlantic and Indo-Pacific.

The flesh of this species is said to be both wholesome and of good flavour.

Alutera scripta (Osb.).

1757. Osbeck, Iter Chinensis, p. 144.

1878–88. Day, Fish. India, p. 694, pl. clxxvi, fig. 3 (synonymy).

1918. Regan, Ann. Durban Mus., vol. ii, pt. 2, p. 77.

Skin velvety. Body oblong. Head deep. Snout produced, upper profile concave. Eye small, about 4 in snout. D I+43–47; spine feeble, not more than $\frac{1}{2}$ length of head, rough but without barbs. A 46–49. Soft dorsal and anal low. Caudal fin at least as long as head, the middle rays much longer than the others.

Length.—Up to 600 mm.

Colour.—Brownish or olivaceous, with dark spots and light (bluish) curved irregular streaks.

Locality.—Natal coast.

Distribution.—Tropical Atlantic and Indo-Pacific.

Fam. 3. Ostraciontidae.

Box-fishes.

Maxilla and premaxilla fused. Teeth separate, incisor-like. No spinous dorsal. No ventral fins. Body encased in a carapace formed of large, firmly united, bony plates, mostly hexagonal in shape.

The Box-fishes (Trunk-fishes or Coffer-fishes) form a comparatively small family of tropical shallow-water fishes.

Key to the South African genera.

1. Carapace 4- or 5-angled . . . . . *Ostracion.*
2. Carapace 3-angled . . . . . *Lactophrys.*

Gen. Ostracion Linn.

1758. Linné, Syst. Nat., ed. 10, p. 330.

Carapace extending beyond and closed behind anal fin. Body 4- or 5-angled, *i.e.* two ridges on each side, and often a dorsal one. Caudal peduncle naked. Vertebrae 16, not elongate.

Key to the South African species.

1. Carapace 4-angled, without spines (*Ostracion*).
   - *a.* Anterior opening of carapace broad. Black spots . . *tuberculatus.*
   - *b.* Anterior opening of carapace narrow. White spots . . *punctatus.*

2. Carapace 4-angled, with spines (*Lactoria*).
   a. A spine in middle of back . . . . . *diaphanus.*
   b. No spine in middle of back . . . . . *cornutus.*
3. Carapace 5-angled (*Tetrosomus*) . . . . . *fornasini.*

Ostracion tuberculatus Linn.

Four-angled Box-fish.

1758. Linné, Syst. Nat., ed. 10, p. 331 (*tuberculatus*) and p. 332 (*cubicus*).

1878–88. Day, Fish. India, p. 696, pl. clxxxi, fig. 3.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 425 (references and synonymy).

Body 4-angled, without spines, ridges blunt. Back slightly convex, without any median ridge. Interorbital space concave. Snout with a hump immediately above the mouth in the adult, dorsal profile concave. Width of anterior opening of the carapace greater than orbit.

Length.—Up to 375 mm.

Colour.—Brownish, with black dots on head, sides, and belly; each scute with a bluish dark-edged ocellus; tail uniform, or with black dots (never white dots).

Locality.—Coast of Natal and Portuguese East Africa.

Distribution.—Indo-Pacific, Australia.

Ostracion punctatus Bl. Schn.

White-spotted Box-fish.

1801. Bloch-Schneider, Syst. Ichth., p. 501 (and *lentiginosus*).

1865. Bleeker, Atlas Ichthyol., vol. v, p. 39, pl. ccii, fig. 4.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 261.

Body 4-angled, without spines, ridges blunt. Back slightly convex, without any median ridge. Interorbital space flat. Snout with dorsal profile concave. Width of anterior opening of carapace narrow, less than orbit.

Length.—Up to 165 mm.

Colour.—Brownish, with numerous white dots on all parts, some of them confluent into undulated lines.

Locality.—Natal coast.

Distribution.—Indo-Pacific.

Ostracion diaphanus Bl. Schn.

Diaphanous Box-fish.

1801. Bloch-Schneider, Syst. Ichth., p. 501.

1865. Bleeker, Atlas Ichthyol., vol. v, p. 33, pl. ccii, fig. 2, and pl. cciv, fig. 3 (*cornutus* non Linn.).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 426 (references and synonymy).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 163 (references).

Body 4-angled. A pair of antorbital spines, a compressed spine in middle of back, one on the dorso-lateral ridge opposite the mid-dorsal spine, two on the ventro-lateral ridge, which ends in a strong spine. Spines strong, but not elongate.

Length.—Up to 220 mm.

Colour.—Light brownish, silvery below, immaculate or with dark spots.

Locality.—Table Bay and False Bay to Natal, down to 36 fathoms.

Distribution.—Indo-Pacific, Australia.

Ostracion cornutus Linn.

Box-fish ; Cow-fish.

1758. Linné, Syst. Nat., ed. 10, p. 331.

1878–88. Day, Fish. India, p. 697, pl. clxxvi, fig. 4.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 423 (references and synonymy).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 162 (references and synonymy).

Body 4-angled. A pair of antorbital spines, slender, elongate, directed forwards. Each dorso-lateral ridge and the median line of the back with a slight prominence, but no spine. Ventro-lateral ridge ending behind in a long slender spine. Caudal fin very long in adult examples.

Length.—Up to 350 mm.

Colour.—Brownish, body and tail with bluish or blackish spots.

Locality.—Coast of Natal and Portuguese East Africa.

Distribution.—Indo-Pacific, Australia.

**Ostracion fornasini* Bianc.

1846. Bianconi, Nov. Ann. Sci. Nat. Bologna, ser. 1, vol. v.

1855. *Id.*, Spec. Zool. Mossamb., p. 229, pl. i, fig. 1.

1865. Bleeker, Atlas Ichthyol., vol. v, p. 34, pl. cciii, fig. 4.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 264.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 38, pl. ix, fig. 1 (*fuscomaculata*).

Body 5-angled, the back elevated in a compressed ridge, capped with a strong recurved spine. A pair of strong, but not elongate, antorbital spines. Ventro-lateral ridge ending in a strong spine.

Length.—Up to 150 mm.

Colour.—Yellowish or brownish, with dark irregular spots and lines.

Locality.—Coast of Natal and Portuguese East Africa.

Distribution.—Indo-Pacific.

Type of *fuscomaculata* in coll. Govt. Marine Survey.

Gen. Lactophrys Swains.

1839. Swainson, Nat. Hist. Classif. Fish., vol. ii, pp. 194, 324.

Carapace extending beyond and closed behind anal fin. Body 3-angled. Caudal peduncle naked. Vertebrae 14, the first 8 elongate.

L. quadricornis Linn. has been recorded from Angola, and is distinguished from the following species by having the supraorbital spines pointing forwards.

Lactophrys concatenatus (Bl.).

Three-angled Box-fish.

1795. Bloch, Ausl. Fische, pl. cxxxi.

1849. Smith, Illustr. Zool. S. Afr. Pisces, pl. 18 (*bicuspis*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 423 (references).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 164 (references).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 37.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 265 (*gibbosus* non Linn.).

Body 3-angled, the ridges sharp. Dorsal ridge with two compressed small spines, each ventro-lateral ridge with two similar spines. Supraorbital ridge with a very small spine, directed outwards and backwards ; occasionally two spines, often none at all. All spines tend to become less prominent or even obsolete in large specimens. In the young (25 mm.) there are nearly always two supraorbital spines, and a spine at both the anterior and posterior ends of the ventro-lateral ridge. A knob or tubercle on snout immediately above mouth

in adult specimens. Whole of the skin granulate, without any bare areas on the margins of the scutes. (Plate XXXVI, fig. 5.)

Length.—Up to 250 mm.

Colour.—Yellowish or brownish, head sometimes suffused with darker, belly silvery.

Locality.—False Bay to Natal, down to 50 fathoms.

Distribution.—East coast of Africa, Indian seas.

Closely allied to *stellifer* Bl. from Australia and the Indo-Pacific *gibbosus* Linn. The latter is distinguished by the single, very large, triangular spine on the dorsal ridge.

Jordan and Hubbs (1925, Mem. Carn. Mus., vol. x, p. 256) quote the reference to Gilchrist and Thompson in their synonymy of *stellifer*, and institute the new genus *Triorus* for this species. If this synonymy is accepted the distribution of the species extends to Japan and Australia.

Fam. 4. Tetrodontidae.

Globe-fishes ; Blaasops (Cape) *; Tobies* (Natal).

Maxilla and premaxilla fused. Teeth fused into a beak, with a median suture. No spinous dorsal. No ventral fins. No anal spines. Caudal normal. Skin naked or with movable spines, rarely with bony plates. Belly inflatable. Air-bladder present.

The Globe-fishes, or Puffers, form a rather large family of tropical shallow-water fishes. Some of them live in brackish water and rivers. They are remarkable for their capacity to inflate the belly, often to such an extent that the body becomes almost spherical. Their flesh is poisonous.

Key to the South African genera.

1. Back more or less rounded. Nostrils usually distinct . . . *Tetrodon.*
2. Back more or less sharply ridged. Nostrils inconspicuous or obsolete *Tropidichthys.*

Gen. Tetrodon Linn.

1758. Linné, Syst. Nat., ed. 10, p. 332.

Body oblong or elongate, broad or somewhat compressed, scabrous or smooth. Nostrils on each side separate or confluent, sessile or on a papilla, or tubular, or imperforate. Dorsal rays 6–19, anal 6–17.

Several attempts have been made to subdivide this large genus, but as there are so many gradations from one form to another, the various subgenera are often ill-defined. In this work all the species are grouped in the comprehensive genus *Tetrodon*.

Key to the South African species.

I. Nostrils paired, sessile (*i.e.* flush with the surface), or on a short papilla.
  A. A lateral cutaneous fold.
    1. Nostrils flush with surface. D and A 12–15, more or less falcate.
      a. Whole interocular space bony (*Lagocephalus*).
        i. Back naked. Caudal lunate . . *lagocephalus.*
        ii. Back spinulose. Caudal truncate . . *oblongus.*
      b. Bony interorbital not as wide as interocular space (*Spheroides*).
        i. Back naked . . . . . *inermis.*
        ii. Back spinulose.
          α. Back uniformly coloured . . . *spadiceus.*
          β. Back spotted. A triangular silvery patch in front of eye . . . . . *sceleratus.*
    2. Nostrils on a short papilla. D 8–9. A 7–8.
      a. Upper teeth much smaller than lower. Back black, with yellow spots . . . . . *honckeni.*
      b. Upper teeth not much smaller than lower. Cheek with one or more cross-bars . . . . *hypselogeneion.*
  B. No lateral fold. Dorsal in advance of anal, both rounded, of 6–9 rays.
    1. Body smooth and naked (*Liosaccus*) . . . . *cutaneus.*
    2. Body spinulose . . . . . *spinosissimus.*
II. Nostril on each side single, tubular . . . . . *pleurospilus.*
III. Nostril a single, imperforate cavity surrounded by a lobed margin *patoca.*
IV. Nostril on each side consisting of a bifid solid tentacle.
  A. Spots darker than ground colour. Vent in a black ring *aerostaticus.*
  B. Upper and lower margins of caudal fin black . . *immaculatus.*
  C. One or two pale rings round pectoral. . . . . *hispidus.*

Tetrodon lagocephalus Linn.

Atlantic Blaasop.

1759. Linné, Amoen. Acad., vol. i, p. 310, pl. xiii, fig. 4.

1808. Donovan, Brit. Fish., vol. iii, pl. lxvi (*stellatus*).

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 273.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 166 (references).

? 1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 267 (*stellatus*).

Body elongate, depth about 6 in length. Naked above and on sides. Belly from below middle of snout almost up to vent with fixed 4-rooted short spines. Lateral cutaneous fold distinct. Length of head less than its distance from dorsal fin. Interocular width equal to snout and to postorbital part of head. Upper margins of orbits formed by the lateral expansions of the frontals, the whole interocular space being thus formed by the bony interorbital. Nostrils

paired, flush with surface of snout. Mucous canals on head distinct. D 14. A 12. Both falcate. Caudal lunate. Pectoral equal to distance from point of snout to hind margin of eye, somewhat falcate.



Fig. 29.—Diagrams of right nostrils of *Tetrodon*: a, *inermis*; b, *honckeni*; c, *pleurospilus*; d, *patoca*; e, *immaculatus*.

Length.—Up to 525 mm.

Colour.—Back dark brown or bluish-black, sides silvery, belly white, small round black spots along sides; fins dark, except the lower $\frac{1}{3}$ of pectoral, which is white; young with dark cross-bands on back as well as black spots on belly.

Locality.—Table Bay and False Bay to Algoa Bay and Natal.

Distribution.—Atlantic and Mediterranean, Mauritius.

It seems a little uncertain whether the *lagocephalus* of Linné, supposed to be founded on Indian specimens, is identical with the *lagocephalus* of Günther or *stellatus* Donovan from Europe.

**Tetrodon oblongus* Bl.

Olive Toby.

1795. Bloch, Ausl. Fische, vol. ii, p. 6, pl. cxlvi, fig. 1.

1855. Bianconi, Spec. Zool. Mossamb., p. 224, pl. ii, fig. 1 (*hartlaubi*).

1865. Bleeker, Atlas Ichthyol., vol. v, p. 62, pl. ccviii, fig. 4.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 278 (part).

1878–88. Day, Fish. India, p. 702, pl. clxxxii, fig. 3.

Body moderately elongate, depth 3 in length. Back, belly, a band in front of, and another behind pectoral with small 2-rooted spines. Lateral fold moderately distinct. Length of head equal to its distance from dorsal. Interocular space exceeding length of snout. Eye about midway between end of snout and gill-opening. Interorbital (in adults) broad, equal to length of snout. Nostrils paired, flush with surface. D 12. A 10–11. Both falcate. Caudal truncate. Pectoral slightly longer than snout.

Length.—Up to 375 mm.

Colour.—Olivaceous, whitish below, back with brown bands enclosing irregular oblong or round light spots.

Locality.—Mozambique.

Distribution.—Indo-Pacific.

Tetrodon inermis Schleg.

Toby ; Grey Blaasop.

1847. Schlegel, Fauna Jap. Poiss., p. 278, pl. cxxii, fig. 2.

1878–88. Day, Fish. India, p. 701, pl. clxxx, fig. 1.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 431 (references).

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., vol. i, p. 39.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 266.

Body rather elongate, depth about 4 in length. Naked above and on sides. Belly from below middle of snout to vent with lines of pores or granules, representing spines. Lateral folds usually distinct. Length of head about equal to its distance from the dorsal. Interocular space not quite equal to length of snout. Eye nearer to gill-opening than to end of snout. Interorbital equal to postorbital part of head. Nostrils paired, flush with surface of snout. Mucous canals distinct. D 12. A 11–12. Both somewhat falcate. Caudal lunate. Pectoral rounded, a little less than length of snout.

Length.—Up to 500 mm.

Colour.—Uniform greenish-grey above, silvery or whitish below.

Locality.—Coast of Natal and Zululand, down to 45 fathoms.

Distribution.—Indian seas, Japan, Australia.

The American *laevigatus* Linn. differs only in having small but definite 3-rooted spines.

Tetrodon spadiceus Rich.

Golden Toby.

1844. Richardson, Voy. Sulphur, Ichthyol., p. 123, pl. lviii, figs. 4, 5.

1865. Bleeker, Atlas Ichthyol., vol. v, p. 64, pl. ccvii, fig. 1.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 431 (*lunaris* var. *spadiceus*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 167 (references).

Body rather elongate, depth about 4 in length. Interorbital and fore part of back and belly with small spines ; snout, sides, and tail naked. Lateral fold distinct. Length of head equal to or a little less

than its distance from the dorsal. Interocular space subequal to snout. Eye nearer gill-opening than to end of snout. Interorbital equal to postorbital part of head. Nostrils paired, flush with surface of snout. Mucous canals distinct. D 12. A 12. Both somewhat falcate. Caudal lunate. Pectoral longer than snout.

Length.—Up to 300 mm.

Colour.—Uniform brown above, sides silvery, belly white, fins yellowish.

Locality.—Port Elizabeth to Natal, Delagoa Bay.

Distribution.—Indo-Pacific, Australia.

All the specimens examined belong to this form, which is sometimes considered as a variety of *lunaris* Bl. Schn. It seems, however, to be constantly distinguished by the rather shorter head and having only the fore part of the back spinulose ; in *lunaris* the whole of the back is spinulose.

Tetrodon sceleratus Forster.

Silver Blaasop.

1788. (Forster), Gmelin, Syst. Nat., p. 1444.

1832. Bennett, Proc. Zool. Soc. Lond., vol. ii, p. 184 (*argyropleura*).

? 1861. Castelnau, Mem. Poiss. l'Afr. Austr., p. 75 (*blochi*).

1865. Bleeker, Atlas Ichthyol., vol. v, p. 64, pl. ccix, fig. 1.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 276.

1878–88. Day, Fish. India, p. 701.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 265.

Body elongate, depth 4–4½ in length. Caudal peduncle depressed. Head and back finely spinulose, belly with very small 3-rooted spines extending slightly beyond anal fin, sides naked. Lateral fold distinct from tail to chin. Length of head ⅔–¾ its distance from the dorsal. Interocular space about equal to snout. Eye nearer to gill-opening than to end of snout. Interorbital equal to postorbital part of head. Nostrils paired, flush with surface. Mucous canals distinct. D 11–12. A 10–11. Both somewhat falcate. Caudal lunate. Pectoral about equal to snout.

Length.—Up to 700 mm.

Colour.—Brownish or olivaceous above, with numerous small round black spots, sides with a distinct silvery band, below which a light brown band running around chin, belly white, a triangular silvery patch before the eye, gill-opening black.

Locality.—False Bay, Natal coast.

Distribution.—Indo-Pacific, Australia.

One small specimen only. Castelnau's inadequately described species may possibly be synonymous, or may only be a young specimen of the following species.

Tetrodon honckeni Bl.

Blaasop.

1795. Bloch, Ausl. Fische, vol. i, p. 133, pl. cxliii.
1861. Castelnau, Mem. Poiss. l'Afr. Austr., p. 74 (*algoensis*).
1865. Bleeker, Atlas Ichthyol., vol. v, p. 60, pl. ccvi, fig. 2.
1914. Gilchrist, Mar. Biol. Rep., vol. ii, p. 109 (habits).
1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 429 (references).
1918. Thompson, Mar. Biol. Rep., vol. iv, p. 166 (references).
1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 40.
1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 267.

Body rather plump, depth 3–3½ in length. Caudal peduncle stout. Head, back, and belly, and a narrow band connecting back and belly behind pectoral, with small cutaneous scale-like papillae; spines minute, resembling setules, in adult usually obsolete; a few similar papillae extending to the tail along the lateral line and the lateral fold, which latter is distinct only on the posterior part of body. Length of head less than its distance from the dorsal. Interorbital space nearly twice length of snout. Eye slightly nearer end of snout than gill-opening. Bony interorbital narrow, twice in postorbital part of head. Snout short, lower jaw prominent, chin square. Upper teeth much smaller than lower. Nostrils paired, on a short papilla. Mucous canals moderately distinct. D 8–9. A 7–8. Both slightly falcate. Caudal truncate. Pectoral equal to interorbital width. (Plate XXXVI, fig. 6.)

Length.—Up to 300 mm.

Colour.—Bluish or brownish-black above, with numerous irregular lemon-yellow or whitish spots of various sizes, belly pale yellowish, caudal fin black.

Locality.—False Bay, Agulhas Bank to Natal and Zululand.

Distribution.—East Indies, China.

Tetrodon hypselogeneion Blkr.

Banded-cheek Blaasop.

1852. Bleeker, Nat. Tyds. Ned. Ind., vol. iii, p. 300.
1865. *Id.*, Atlas Ichthyol., vol. v, p. 61, pl. ccxiii, fig. 5.

1878–88. Day, Fish. Ind., p. 702, pl. clxxxiii, fig. 5.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 430 (references).

Body not very elongate, depth 3½–4 in length. Whole body, except the sides on the posterior half of body and caudal peduncle, the upper and lower surfaces of the latter and the chin, with minute spinules hidden under scale-like cutaneous papillae. Lateral fold not very distinct. Length of head equal to its distance from dorsal. Interocular space a little greater than snout. Eye midway between end of snout and gill-opening. Interorbital very narrow, less than diameter of eye. Lower jaw prominent, chin square. Upper teeth not much smaller than lower. Nostrils paired, on a short papillae. Mucous canals indistinct. D 9. A 7–8. Both somewhat rounded. Caudal truncate. Pectoral equal to length of snout plus eye.

Length.—Up to 150 mm.

Colour.—Brown or black above, with numerous small, round, whitish spots, sides silvery, belly white, cheek with 1–5 cross-bars.

Locality.—Port Elizabeth to Natal, Delagoa Bay, Mozambique.

Distribution.—Indo-Pacific.

The South African specimens have only one well-defined cross-bar on the cheek in place of the usual 3-5.

Tetrodon cutaneus Gnthr.

Smooth Blaasop.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 287.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 165.

1919. Fowler, Proc. U.S. Nat. Mus., vol. lvi, p. 206, fig. 3.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 40, pl. ii, fig. 3 (*dubius*).

Body oblong, depth 3–3½ in length. Whole body perfectly naked and smooth, with innumerable very fine longitudinal wrinkles. No lateral fold. Length of head a little more than its distance from dorsal. Interocular space equal to or a little more than length of snout. Eye nearer gill-opening than to end of snout. Interorbital slightly less than postorbital part of head. Mucous canals faint. Nostrils paired, on a short papilla. D 8–9. A 7–8. Both small, oblong ; dorsal wholly in advance of anal. Caudal truncate. Pectoral subequal to postorbital part of head.

Length.—Up to 312 mm.

Colour.—Greyish or olive above, lighter on sides, which are not

silvery ; belly white ; dorsal and anal whitish, pectoral pale olive, caudal suffused with black at end.

Locality.—Table Bay, Algoa Bay, Natal coast, down to 100 fathoms.

Distribution.—St. Helena, Azores.

Type of *dubius* in coll. Govt. Marine Survey.

Günther queried the Cape as a locality for this species, but there is no doubt that these specimens are identical with his. The Table Bay specimen bridges the gap in the distribution.

Tetrodon spinosissimus Regan.

Many-spined Blaasop.

1908. Regan, Tr. Linn. Soc. Lond., Zool., vol. xii, pt. 3, p. 253, pl. xxxi, fig. 5.

1910. Annandale and Jenkins, Mem. Ind. Mus., vol. iii, pt. 1, p. 14, pl. i, fig. 2.

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 39, pl. ii, fig. 1 (*unifasciatus*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 265 (*unifasciatus*).

Body rather short, depth about 2 in length. Whole body, except lips and caudal peduncle, with rather strong 2-rooted spines. No lateral fold. Length of head less than its distance from dorsal fin. Eye subequal to snout, and midway between end of snout and gill-opening. Interocular space nearly twice, interorbital scarcely more than $\frac{1}{2}$, diameter of eye. Mucous canals distinct. Nostrils paired, on a short papilla. D 8. A 6–7. Both small, oblong ; dorsal in advance of anal (not well shown in Regan's figure). Caudal truncate. Pectoral slightly longer than postocular part of head.

Length.—Up to 110 mm.

Colour.—Grey above, lighter below ; a dark spot above and behind each eye, another at base of dorsal ; a diffuse dark patch on side ; fins light ; caudal with black posterior margin ; minute black specks over the belly.

Locality.—Coast of Natal and Zululand, 40–120 fathoms.

Distribution.—Seychelles, 123 fathoms ; Indian seas, 100 fathoms ; Hong Kong.

Type of *unifasciatus* in coll. Govt. Mar. Survey.

Tetrodon pleurospilus Regan.

1919. Regan, Ann. Durban Mus., vol. ii, pt. 4, p. 203.

Body rather elongate, depth about 3 in length. Naked, except for a patch of spines on belly extending from below eye to vent. No lateral fold. Length of head rather less than its distance from the dorsal. Interocular space rather greater than length of snout, interorbital equal to postocular part of head. Eye about midway between gill-opening and end of snout, which is rather pointed. Mucous canals indistinct. Each nostril consisting of a short tube bilobed at its end. D 9. A 7. Both small, oblong; anal arising below last dorsal ray. Caudal subtruncate. Pectoral slightly shorter than length of snout.

Length.—Up to 200 mm.

Colour.—Dark brown above, belly white; sides with a series of more or less confluent dark spots running from mouth to tail and connected with the dark upper parts by 4 irrregular transverse bars, 1 across cheek, 1 before and behind gill-opening, 1 just in front of level of dorsal, and 1 at base of caudal peduncle.

Locality.—Natal coast.

Type in British Museum.

Tetrodon patoca Ham. Buch.

1822. Hamilton-Buchanan, Fish. Ganges, pp. 7, 363, pl. xviii, fig. 2.

1865. Bleeker, Atlas Ichthyol., vol. v, p. 76, pl. ccx, fig. 2.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 288.

1878–88. Day, Fish. Ind., p. 703, pl. clxxxii, fig. 4 (references).

Body oblong, depth about $3\frac{1}{3}$ in length. Back and belly with very small spines, rest of body naked. No lateral fold. Length of head rather less than its distance from dorsal fin. Interocular space greater than snout, about $\frac{2}{3}$ length of head, interorbital equal to postocular part of head. Eye midway between end of snout and gill-opening. Mucous canals moderately distinct. Each nostril a single imperforate cavity with a raised, lobed margin. D 9–10. A 8–9. Both rounded. Caudal subtruncate. Pectoral equal to snout.

Length.—Up to 325 mm.

Colour.—Brownish above, with numerous round or oval white spots; belly white; young often with 4 blackish cross-bands (through eyes, pectoral, dorsal, and end of caudal peduncle); fins light, end half of caudal fin suffused with blackish.

Locality.—Delagoa Bay, Chinde.

Distribution.—Indian seas, East Indies, China.

Tetrodon aerostaticus Jenyns.

Black-spotted Toby.

1842. Jenyns, Voy. Beagle, Zool., p. 152.

1878–88. Day, Fish. Ind., p. 705, pl. clxxxiii, fig. 3 (*stellatus*).

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 429 (references and synonymy).

Body oblong, depth about $2\frac{1}{2}$ in length. Whole body, except lips and extreme end of caudal peduncle, with small spines. Length of head about equal to its distance from dorsal fin. Eye midway between gill-opening and end of snout. Interocular space about equal to, interorbital $\frac{4}{5}$, length of snout. Each nostril with a bifid tentacle, without opening. D 10–11. A 10–11. Both rounded. Caudal rounded. Pectoral less than snout.

Length.—Up to 600 mm.

Colour.—Dark brown above, with black spots, which are confluent into stripes in young ; belly whitish, in adult without stripes or with very faint darker lines, in young with rather broad black bands which are either confluent or broken up into spots ; fins more or less spotted, base of pectoral and a ring round gill-opening black ; lower lip black, a black ring round vent.

Locality.—Natal coast, Mozambique.

Distribution.—Indo-Pacific, Australia.

Tetrodon immaculatus Bl. Schn.

Immaculate Toby.

1801. Bloch-Schneider, Syst. Ichthyol., p. 507.

1878–88. Day, Fish. Ind., p. 703, pl. clxxxiii, fig. 4.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 427 (references and synonymy).

var. *virgata* Rich.

Banded Toby.

1846. Richardson, Voy. Erebus and Terror, Fish., p. 62, pl. xxxix, figs. 8, 9.

1917. Gilchrist and Thompson, *loc. cit.*, p. 428 (references and synonymy).

Body oblong, depth about 3 in length. Whole body, except lips

and hind part of caudal peduncle, with small spines. Length of head about equal to its distance from the dorsal. Eye midway between gill-opening and end of snout. Interocular space about equal to, interorbital $\frac{3}{4}$, length of snout. Each nostril with a bifid tentacle, without opening. D 9–10. A 9–10. Both rounded. Caudal rounded. Pectoral scarcely as long as snout.

Length.—Up to 300 mm.

Colour.—Olivaceous, lighter below, with or without several dark longitudinal stripes, sometimes a white spot over eye ; caudal fin with upper and lower margins and end black, base of pectoral black ; no black ring round vent.

Locality.—Natal, Delagoa Bay.

Distribution.—Indo-Pacific, Australia.

The banded variety seems to be much rarer in Natal waters than the immaculate form.

Tetrodon hispidus Lacép.

Rough Toby.

1798. Lacépède, Hist. Nat. Poiss., vol. i, p. 487, pl. xxiv, fig. 2.

1878–88. Day, Fish. Ind., p. 706, pl. clxxxiii, fig. 2.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 427 (references and synonymy).

Body oblong, depth about 3 in length. Whole body, except snout and hind part of caudal peduncle, with short bristle-like spines. Length of head about equal to its distance from dorsal fin. Eye midway between gill-opening and end of snout. Interocular width equal to, interorbital $\frac{2}{3}$, length of snout. Each nostril with a bifid tentacle, without opening. D 10. A 10. Both rounded. Caudal rounded or subtruncate. Pectoral nearly as long as snout.

Length.—Up to 500 mm.

Colour.—Dark brown above, with scattered, round, bluish-white spots ; sides often with 4–5 vertical dark cross-bars, belly white, with or without numerous longitudinal dark stripes ; fins pale or dusky, caudal often with pale spots, a dark blotch round gill-opening and pectoral, bordered by one or two whitish rings, no black ring round vent.

Locality.—East London to Natal and Portuguese East Africa.

Distribution.—Indo-Pacific, Australia.

Gen. Tropidichthys Blkr.

1839. Swainson, Nat. Hist. Class. Fish., vol. ii, p. 194 (*Canthigaster*, no type specified).

1854. Bleeker, Nat. Tyds. Ned. Ind., vol. vi, p. 500 (*Tropidichthys*).

Body short, deep, compressed, the back more or less sharply ridged. Nostrils very small and inconspicuous, sometimes apparently imperforate. Dorsal rays 8–12, anal 8–10.

Key to the South African species.

1. No black spot at base of dorsal fin.
   a. D 11–12. No dark cross-bands . . . . . *natalensis.*
   b. D 9(–10). Three to four dark cross-bands . . . . *valentini.*
2. A black spot at base of dorsal fin.
   a. Body with light spots . . . . . *margaritatus.*
   b. Body with 2 dark stripes from pectoral to tail . . *caudofasciatus.*

**Tropidichthys natalensis* (Gnthr.).

1865. Bleeker, Atlas Ichthyol., vol. v, p. 79, pl. ccxiii, fig. 7 (*amboinensis*).

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 303 (*amboinensis* var.)

1908. Regan, Tr. Linn. Soc. Lond., vol. xii, pt. 3, p. 253.

1917. Gilchrist and Thompson, Ann. Durban Mus., vol. i, pt. 4, p. 431.

Profile of the back low. No black spot at base of dorsal fin. Head and body scabrous. D 11–12. A 11.

Length.—Up to 220 mm.

Colour.—Olivaceous, with numerous roundish, black spots, intermixed with similar white ones, the sides of the head in front of pectoral and basal half of caudal fin ornamented like the rest of the body, cheeks with short horizontal and vertical bluish lines.

Locality.—Natal coast.

Distribution.—Seychelles.

This form appears to be merely a colour variety of the East Indian *amboinensis* Blkr.

**Tropidichthys cinctus* (Rich.).

Valentyn's Blaasop ; Zeehaantje (Dutch East Indies).

1850. Richardson, Voy. Samarang, Zool., p. 19.

1854. Bleeker, Nat. Tyds. Ned. Ind., vol. iv, p. 130 (*valentini*).

1855. Peters, Wiegm. Arch. Naturge., vol. xxi, p. 275 (*taeniatus*).

1865. Bleeker, Atlas Ichthyol., vol. v, p. 80, pl. ccviii, fig. 1 (*valentini*).

1905. Jordan and Evermann, Bull. U.S. Fish. Comm., vol. xxiii, p. 433, fig. 189.

Profile of back rather high. No dark spot at base of dorsal. D 9–10. A 9. Head and body scabrous.

Length.—Up to 175 mm.

Colour.—Olivaceous, lighter below, 3–4 dark brownish-black cross-bands, body with orange ocelli, head with bluish lines.

Locality.—Mozambique.

Distribution.—Indian seas, East Indies, Polynesia.

**Tropidichthys margaritatus* (Rüpp.).

Ocellate Toby.

1828. Rüppell, Atlas Fische, p. 66.

1844. Richardson, Voy. Sulphur, Fish., p. 125, pl. lvii, figs. 4–6 (*solandri*).

1850. *Id.*, Voy. Samarang, Fish., p. 20, pl. ix, figs. 1, 2 (*insignitus*).

1855. Bianconi, Mem. Acad. Sc. Bologn., vol. vi, p. 147, pl. ii, fig. 2 (*petersi*).

1855. Peters, Wiegm. Arch. Naturge., p. 274 (*ocellatus*).

1865. Bleeker, Atlas Ichthyol., vol. v, pp. 80, 81, pl. ccxiv, fig. 5, and pl. ccxiii, fig. 4 (*ocellatus* and *margaritatus*).

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 300.

1878–88. Day, Fish. Ind., p. 707 (references).

1910. Annandale and Jenkins, Mem. Ind. Mus., vol. iii, pt. 1, p. 16, pl. i, fig. 3.

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 266.

Profile of back rather high. A black spot at base of dorsal fin. Head and body scabrous. D 9–10. A 9.

Length.—Up to 150 mm.

Colour.—Dull orange or olivaceous, lighter below, with numerous yellow (or bluish) dark-edged ocelli on back and sides, those on the back more or less confluent into horizontal or transverse angular stripes; lines on the head horizontal, a black spot at base of dorsal, fins yellowish.

Locality.—Natal, Mozambique.

Distribution.—East coast of Africa, Indo-Pacific.

Tropidichthys caudofasciatus (Gnthr.).

Two-stripe Toby.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 304.

1900. Steindachner, Denks. Ak. Wiss. Wien, vol. lxx, p. 518, pl. iii, fig. 3.

1901. Jenkins, Bull. U.S. Fish. Comm., vol. xix (1899), p. 400, fig. 12 (*bitaeniatus*).

1905. Jordan and Evermann, *ibid.*, vol. xxiii (1903), p. 435, fig. 191 (*bitaeniatus*).

1908. Regan, Tr. Linn. Soc. Lond., Zool., vol. xii, pt. 3, p. 253.

Profile of back low. A black (ill-defined) spot at base of dorsal. Belly spinulose, a very few feeble spinules on back and nape, rest of body naked. D 10. A 10.

Length.—Up to 90 mm.

Colour (as preserved).—Brownish above, with small, dark brown spots and reticulations ; a blackish ill-defined spot at base of dorsal ; a dark stripe from base of upper caudal ray to pectoral, passing round in front of pectoral and running backwards to tail more or less parallel with the upper stripe ; a small black spot on outer side of base of pectoral ; snout suffused, with indistinct darker lines ; curved brown cross-bars on caudal fin and bases of upper and lower caudal rays blackish ; belly whitish, immaculate.

Locality.—Coast of Natal and Zululand, 40 fathoms.

Distribution.—Philippine and Hawaiian Islands ; Seychelles, 37 fathoms.

Fam. 5. Diodontidae.

Porcupine Fishes.

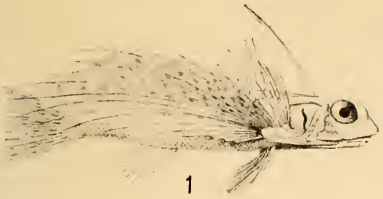
Maxilla and premaxilla fused. Teeth fused into a beak, without median suture. No spinous dorsal. No ventral fins. No anal spines. Caudal normal. Skin with well-developed more or less movable spines. Belly inflatable, but not so strongly as in the *Tetrodontidae*. Air-bladder present.

The Porcupine Fishes live in shallow water in tropical and sub-tropical regions. Their singular form has always attracted collectors of curios, and consequently the majority of species have been well known since the early days of Ichthyology. The synonymy, however, seems considerably confused. The flesh is poisonous.

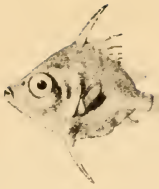
As in the genus *Tetrodon*, attempts have been made to distribute

PLATE XXXVI.

FIG.		TEXT-PAGE
1.	*Dactyloptena orientalis* (C. and V.) (after Day)	947
2.	*Triacanthodes ethiops* Alck. (after Alcock)	949
3.	*Balistes stellatus* Lac. (after Day)	951
4.	*Diodon hystrix* Linn. (after Day)	980
5.	*Lactophrys concatenatus* (Bl.) (after Smith)	964
6.	*Tetrodon honckeni* Bl. (original)	970
7.	*Antennarius hispidus* Bl. Schn. (after Day)	1001
8.	*Chaunax pictus* Lowe (after Goode and Bean)	1003



1



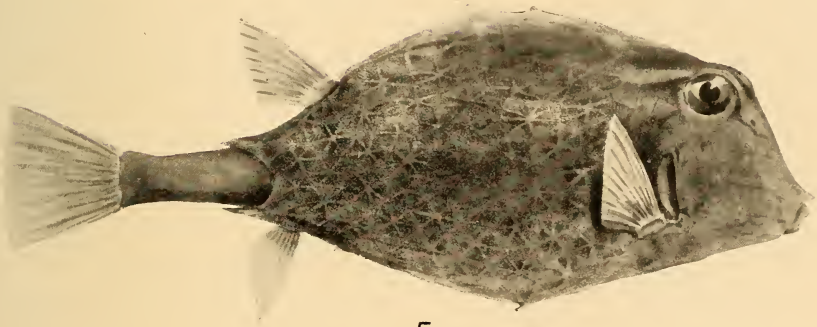
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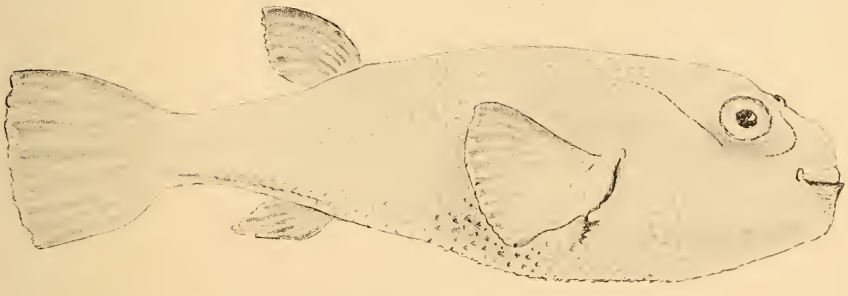
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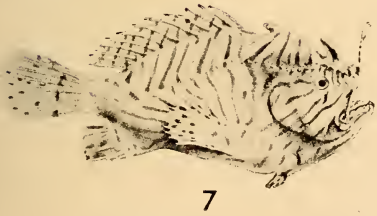
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8

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the species among several genera. Regan and Boulenger, however, recognise only two genera: *Diodon* and *Lyosphaera*. The latter is distinguished by the very fine and feeble spines attached to papery plates, and very short anal fin of only 4 rays.

Gen. Diodon Linn.

1758. Linné, Syst. Nat., ed. 10, p. 335.

Body stout, with strong spines, which are either 2- or 3-rooted; the 2-rooted spines being movable. Nostrils in a tubular papilla. D 10–15. A 10–15.

Key to the South African species.

I. Nasal tube simple, with 2 openings.
  A. Spines mostly 2-rooted, movable (*Diodon*).
    1. Spines not compressed.
      a. Frontal spines longer than others . . *holacanthus.*
      b. Frontal spines shorter than others.
        i. Small round black spots only . . . *hystrix.*
        ii. Large irregular black bands and spots as well as smaller ones . . . . . *maculatus.*
    2. Spines strongly compressed . . . . . *maculifer.*
  B. Spines mostly 3-rooted, immovable (*Chilomycterus*).
    1. Foremost spines 2-rooted, 4–5 over eye . . . *calori.*
    2. All spines 3-rooted.
      a. Three spines over eye.
        i. Nine transverse series before dorsal fin. No skinny tentacles . . . . . *orbicularis.*
        ii. Eleven transverse series. Skinny tentacles scattered over body . . . . . *echinatus.*
      b. Two spines over eye.
        i. Narrow light and dark longitudinal stripes . *spinosus.*
        ii. Large and small black spots . . *antennatus.*
II. Nasal tentacle with 2 branches, no opening (*Dicotylichthys*) . *punctulatus.*

Diodon holacanthus Linn.

Long-spined Porcupine Fish.

1758. Linné, Syst. Nat., ed. 10, p. 335.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 307 (*spinosissimus*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 168 (references).

Spines 2-rooted, subulate, very long and slender; frontal spines at least as long as, usually longer than, those behind the pectoral, about

twice the diameter of eye. Upper part of caudal peduncle with one pair of spines. Fourteen to seventeen transverse series of spines between snout and dorsal fin. Nasal tube simple. D 12–13. A 12.

Length.—Up to 375 mm.

Colour.—Greyish or brownish above, with round black spots, a more or less distinct black band across the chin, belly white, fins pale, dorsal, caudal, and pectoral with black spots.

Locality.—Table Bay.

Distribution.—All warm seas.

It is possible that this form is synonymous with *hystrix*; the two forms may be the two sexes of one species.

Diodon hystrix Linn.

Porcupine Fish; Zee-vark.

1758. Linné, Syst. Nat., ed. 10, p. 335.

1878–88. Day, Fish. India, p. 708, pl. clxxix, fig. 4.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 169 (references and synonymy).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 267.

Spines 2-rooted, subulate, frontal spines shorter than those behind pectoral, not more than $1\frac{1}{2}$ times diameter of eye. Upper part of caudal peduncle with 2–3 pairs of spines. Fourteen to seventeen transverse rows of spines between snout and dorsal fin. Nasal tube simple. D 12. A 12. (Plate XXXVI, fig. 4.)

Length.—Up to 625 mm.

Colour.—Greyish or brownish above, with round black spots, belly white; fins pale, all spotted with black.

Locality.—False Bay, Agulhas Bank, Natal.

Distribution.—All warm seas.

Diodon maculatus Lacép.

1800. Lacépède, Hist. Nat. Poiss., vol. ii, p. 13.

1818. Cuvier, Mem. Mus. Hist. Nat., vol. iv, p. 136 (*multimaculatus*).

1865. Bleeker, Atl. Ichthyol., vol. v, p. 57, pl. ccvi, fig. 3 (*novemmaculatus*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 170 (references).

1922. Norman, Ann. Mag. Nat. Hist., (9), vol. ix, p. 322.

Spines 2-rooted, subulate, frontal spines shorter than those behind pectoral, rather longer than diameter of eye. Upper part of caudal

peduncle without spines. Sixteen to nineteen transverse rows of spines between snout and dorsal fin. Nasal tube simple. D 12. A 12. Usually some skinny tentacles above eye, on back, throat, and belly.

Length.—Up to 300 mm.

Colour.—Greyish or brownish above, with large irregular black patches mixed with small spots, belly white, fins unspotted; the larger patches usually disposed as follows: one between eyes and extending down on to cheek, one across nape extending in front of pectoral, one in middle of back, one behind pectoral, one at base of dorsal extending downwards towards anal.

Locality.—Knysna, Agulhas Bank.

Distribution.—All warm seas.

**Diodon maculifer* Kaup.

Flat-spined Porcupine Fish.

1787. Bloch, Ichthyol., pl. cxxvi (non Linn.).

1855. Kaup, Wiegm. Archiv. Naturge., p. 229.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 171 (references).

Spines 2-rooted, strongly compressed laterally. Upper part of caudal peduncle without spines. About 15 transverse series of spines between snout and dorsal fin. Nasal tube simple.

Length.—Up to 250 mm.

Colour.—Dark above, with round black spots, belly white, fins usually unspotted.

Locality.—Cape seas.

Distribution.—West Indies.

**Diodon calori* Bianc.

1855. Bianconi, Mem. Ac. Sc. Bonon., vol. vi, p. 145.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 309.

Spines short, moderately strong. Foremost spines on head and around snout 2-rooted and erectile, all the rest 3-rooted. Four to five supraorbital spines. About 17 transverse series of spines between snout and dorsal fin. A pair of spines on side of caudal peduncle. Inner masticatory plate with about 7 transverse grooves. Nasal tube simple. D 12. A ?

Length.—Up to 250 mm.

Colour.—Greyish, with a dark bar below eye, another in front of

gill-opening; a blackish blotch behind pectoral; base of dorsal, and a spot on either side of caudal peduncle, black.

Locality.—Mozambique.

Distribution.—East coast of Africa.

Diodon orbicularis Bl.

1787. Bloch, Ichthyol., pl. cxxvii.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 172 (references).

1919. Regan, Ann. Durban Mus., vol. ii, pt. 4, p. 203.

1923. Von Bonde, Fish. Mar. Surv. Spec. Rep., i, p. 38, pl. ix, fig. 2 (*parcomaculatus*).

1925. Fowler, Proc. Ac. Nat. Sci. Philad., vol. lxxvii, p. 267.

All spines 3-rooted, strong but short. Three supraorbital spines and one in middle of forehead. About 9 transverse series between snout and dorsal fin. Caudal peduncle spineless, except roots of a pair of lateral spines crossing behind dorsal fin. Superciliary edges raised. Jaws feeble, inner masticatory surface smooth, concave. Nasal tube simple. D 12. A 12.

Length.—Up to 150 mm.

Colour.—Brownish, irregularly clouded and spotted with black or dark brown, the most constant spots being 2 behind and below the eye, some behind the pectoral, and between the dorsal and anal fins; fins faintly banded.

Locality.—Table Bay (rare), False Bay to Natal, down to 60 fathoms.

Distribution.—Indo-Pacific.

Type of *parcomaculatus* in coll. Govt. Mar. Survey.

Diodon echinatus (Gron.).

1854. Gronovius, Syst., ed. Gray, p. 27.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 312.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 171.

All spines 3-rooted, short and rather feeble. Three supraorbital spines and one in middle of forehead. About 11 transverse series of spines between snout and dorsal fin. Caudal peduncle spineless, but roots of 2 lateral spines crossing behind dorsal fin. Superciliary ridges not raised. Slender filamentous cutaneous tentacles arising from the bases of many of the spines on head, back, sides, and belly. Jaws strong, upper with a median ridge, inner masticatory surface with 2–3 pads, divided by a median line. Nasal tube simple. D 12. A 11.

Length.—Up to 175 mm.

Colour.—Brownish above, belly white, black spots on back, sides, and belly, fins unspotted.

Locality.—False Bay, Agulhas Bank.

Distribution.—There is a specimen, ascribed to this species, from Muscat in the British Museum.

**Diodon spinosus* Linn.

1758. Linné, Syst. Nat., ed. 10, p. 325.

1898. Jordan and Evermann, Fish. Mid. and N. Amer., p. 1748, fig. 649 (*schoepfi*).

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 172 (references and synonymy).

All spines 3-rooted, strong but short. Two supraorbital spines and one in middle of forehead. Superciliary edge raised. Fleshy tentacles along lower parts of sides, one on each side of anal fin especially developed, usually one between the superciliary spines. Caudal peduncle spineless, but roots of 2 lateral spines crossing behind dorsal fin. Nasal tube simple. D 12. A 10.

Length.—Up to 225 mm.

Colour.—Brownish above, with narrow light and dark brown longitudinal stripes which become oblique on sides, a large black blotch behind pectoral and another at base of dorsal fin, belly white, fins unspotted.

Locality.—Cape seas.

Distribution.—N. and S. Atlantic, West Indies.

**Diodon antennatus* Cuv.

1818. Cuvier, Mem. Mus. Hist. Nat., vol. iv, p. 131, pl. vii,

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 171 (references).

All spines 3-rooted, strong but short. Two supraorbital spines and one in middle of forehead. Superciliary edge not raised. Fleshy tentacles along lower parts of sides, one on each side of anal fin especially developed, usually one between the superciliary spines. Caudal peduncle spineless, but roots of 2 lateral spines crossing behind dorsal fin. Nasal tube simple.

Length.—Up to 200 mm.

Colour.—Brownish above, a black spot on nape, one above pectoral, and another at base of dorsal, generally a small black spot below

eye, back and sides also with smaller black spots, belly dusky, fins unspotted.

Locality.—Cape seas.

Distribution.—West Indies.

**Diodon punctulatus* (Kaup).

1855. Kaup, Wiegm. Arch. Naturge., p. 230.

1899. Waite, Mem. Austr. Mus., vol. iv, p. 98, pl. xix.

1918. Thompson, Mar. Biol. Rep., vol. iv, p. 173.

Anterior spines 2-rooted, erectile, rest 3-rooted. Dorsal spines much shorter than those on sides and belly. About 13 transverse series of spines between snout and dorsal fin. Nasal tentacle 2-branched, without opening. D 12. A 12.

Length.—Up to 425 mm.

Colour.—Brownish above, with small round scattered spots; a vertical black bar below eye, a large black spot in front of, and a larger one behind, pectoral; fins unspotted.

Locality.—Cape seas.

Distribution.—Eastern Australia; Mauritius ?

Fam. 6. Molidae.

Sun-fishes.

Maxilla and premaxilla fused. Teeth fused into a beak, without median suture. No spinous dorsal. No ventral fins. No anal spines. No caudal fin. Dorsal and anal fins high. Body strongly compressed, non-inflatable, more or less truncate posteriorly. Skin rough or tessellated. Air-bladder absent. Pseudobranchiae well developed.

The Sun-fish is one of the most remarkable of fishes. The shape of the body, the small mouth, high dorsal and anal fins, and absence of tail fin render it distinctive. To these characters may be added the enormous size (8 or even 10 ft.) and weight to which the species of *Mola* grow.

Sun-fishes are usually captured when swimming at the surface of the open sea, but are known to descend to considerable depths. They swim leisurely, and when at the surface the high dorsal fin projects above the water. They appear to be more or less gregarious, at least at certain seasons (Albert de Monaco, Bull. Soc. Zool. France, vol. xiv, 1889, p. 16, and Pellegrin, *ibid.*, vol. xxxvii, 1912, p. 229).

The species of *Mola* are known to feed chiefly on larval Eels (*Leptocephali*), and Jelly-fishes.

Definite information as to the life-history of the Sun-fishes has only recently been obtained (see Schmidt, Medd. Havunders. Copenhagen, ser. Fisk., 6, 1921, No. 6, and Nature, vol. cvii, No. 2681, p. 76, figs., 1921). The newly hatched larva resembles an ordinary fish, with strong tail. Conical spinose protuberances are developed over

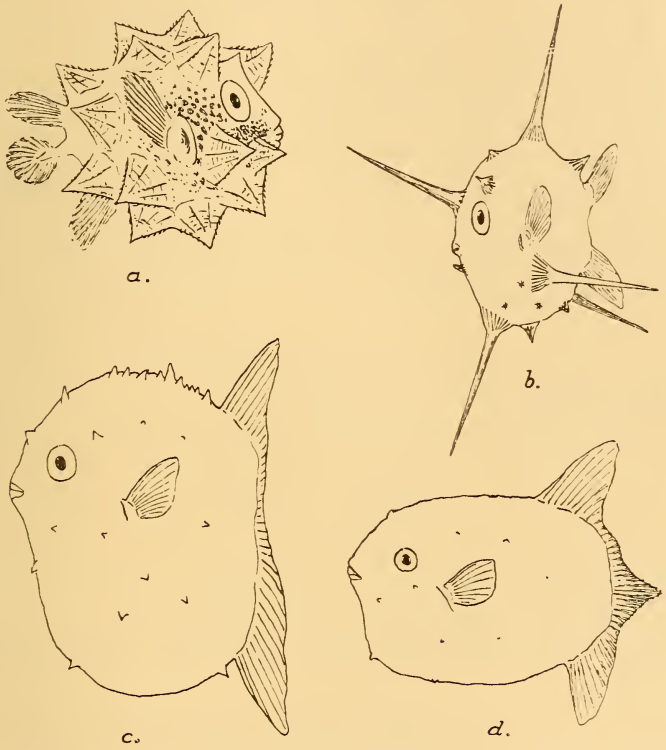


Fig. 30.—Four stages in the growth of the Sun-fish. *a*, *b*, copies from Schmidt; *c*, *d*, copies from Ryder. The younger stages more highly magnified than the older stages.

the whole body (fig. 30 *a*). At a later stage the tail is reduced and (in *Mola lanceolatus*) 5 of the spines reach an enormous development (fig. 30 *b*).

Later all the spines are reduced, though traces of them may be found even in the adult, as for instance the bony tubercles on the throat. The larval forms were formerly placed in a separate genus: *Molacanthus* (fig. 30 *c*, *d*.).

Two genera are recognised.

Key to the South African genera.

1. Skin rough. Gill-rakers concealed in thick skin . . . . . *Mola.*
2. Skin smooth, tesselated with small hexagonal plates. Gill-rakers free *Ranzania.*

Gen. Mola Linck.

1790. Linck, Mag. Neu. Phys. Naturge., vol. vi, pt. 3, p. 37.
1798. Cuvier, Tabl. Elem. Hist. Nat. Anim., p. 323.
1801. Bloch-Schneider, Syst. Ichthyol., p. 510 (*Orthagoriscus*).
1884. Gill, Proc. U.S. Nat. Mus., vol. vii, p. 425 (*Masturus*).

Body ovate, strongly compressed. Skin thick, rough, leathery, granulate, but without bony plates. Gill-rakers (in *lanceolata*) feeble, concealed in thick fleshy skin. I have not been able to examine a fresh example of *mola* to see the character of the gill-rakers.

Two species are recognised.

Key to the South African species.

1. Hind end of body rounded or lobed (*Mola*) . . . . . *mola.*
2. Hind end of body more or less pointed (*Masturus*) . . . *lanceolata.*

Mola mola (Linn.).

Sun-fish.

1758. Linné, Syst. Nat., ed. 10, pp. 334, 412.
1913. Waite, Tr. N.Z. Inst., vol. xlv, p. 223, pl. ix.
1918. Thompson, Mar. Biol. Rep., vol. iv, p. 174 (references and synonymy).

The hind end of the body is truncate, but slightly convex, and divided irregularly into a number of lobes. Snout, particularly in old examples, more prominent than chin. The skin, especially in old examples, is very coarse and rough, with patches of bony tubercles. Dorsal and anal fins, especially in large specimens, short and obtuse.

Length.—Up to 2400 mm. (8 ft.).

Colour.—Uniform greyish or olivaceous-brown, or blackish; young examples dark above, with more or less conspicuous dark round spots on hind part of body, belly whitish; in the very young the belly is silvery.

Locality.—Table Bay, Agulhas Bank, Durban.

Distribution.—Atlantic and Pacific Oceans.

The only record I have of this fish from Durban rests on a newspaper picture, undated. I have not been able to obtain any further

particulars. The figure shows a young specimen, nearly as deep as long; length of dorsal and anal fins subequal to length of head and about 3 in total length ; hind end of body evenly convex, faintly lobed. The upper half of the body is dark and on the hinder part are some dark round spots.

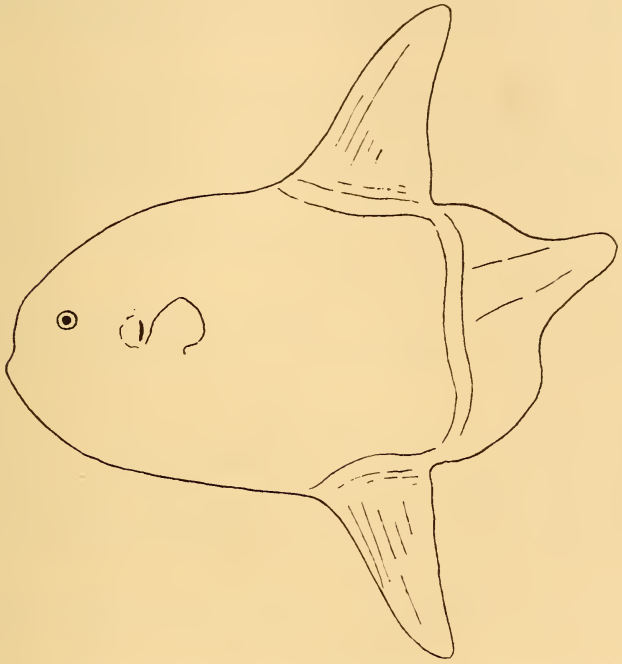


Fig. 31.—Outline of *Mola lanceolata*, from specimen in South African Museum.

Mola lanceolata (Lién.).

Pointed-tailed Sun-fish.

1840. Liénard, Mag. Zool., p. 291.

1870. Günther, Cat. Fish. Brit. Mus., vol. viii, p. 319.

1889. Perugia, Ann. Mus. Civ. Genova, [II], vol. 27.

1896. Collett, Res. Sci. Camp. Monaco, fasc. 10, p. 163, pl. vi, fig. 1 (*mola*).

1922. Jordan and Jordan, Mem. Carn. Mus., vol. x, p. 88, fig. 7.

The hind end of the body is triangularly produced to a point, forming an apparent tail. Chin more prominent than the snout. Skin granular, not so rough as in *mola*. Dorsal and anal fins elevated, pointed, more or less falcate.

Length.—Up to 1875 mm. (6 ft. 3 in.).

Colour.—Dark brown or blackish above, lighter beneath.

Locality.—Table Bay.

Distribution.—Atlantic and Pacific Oceans.

From the records given below it appears that this species, though not observed so often as *mola*, is far from uncommon in South African waters.

By most ichthyologists this form is regarded as synonymous with *mola*. Collett concluded that the pointed "tail" was an abnormal retention in the adult of a juvenile feature. The constancy, however, of the characters observed in these forms indicated a distinct species. Proof of this is now established by the researches of Dr. Schmidt (see reference above), who finds distinguishing features in the larval and post-larval stages of the two forms.

There appear to be more fin-rays in *lanceolata* than in *mola* (Günther gives D 24, A 21, and D 17–18, A 14–19 respectively); but they are difficult to count accurately, and are not taken into account here.

Sun-fishes are of frequent occurrence in, or in the neighbourhood of, Table Bay. They seem to come inshore mostly in mid or late summer as the following records show; contrary perhaps to expectation, they are seldom observed during the winter months when storms and heavy seas come in from the N. and N.W.

(*lanceolata*) February, 1900. Mounted in South African Museum.
(*mola*) April, 1907. Mounted in South African Museum, 7 ft.
(*mola*) 3rd February, 1917.
(*lanceolata*) January, 1918. Mounted in South African Museum, $6\frac{1}{4}$ ft.
(*mola*) 6th November, 1920.
(*lanceolata*) 9th July, 1921.
(*mola*) 25th December, 1923. Two specimens.
(*mola*) 1st January, 1924.
(*mola*) January, 1925.
(*lanceolata*) 6th to 18th March, 1927. Two specimens, one mounted in South African Museum.
(*mola*) June, 1927. Hermanus coast.

These are records notified to, or observed by, the South African Museum. Many other specimens are certainly washed ashore, which are not notified to the Museum.

In all the specimens I have examined there is a band around the

bases of the dorsal and anal fins connected by a vertical band across the base of the tail. In *mola* this band is more or less granular, but never so strongly granular as the rest of the skin, and consequently is always easily distinguishable. In *lanceolata* it is even more distinct, as it is nearly or quite smooth. These bands, of course, are the areas where the skin is pliable, allowing movement of the fins.

Gen. Ranzania Nardo.

1840. Nardo, Ann. Sci. Regno. Lomb. Venet., vol. v, pp. 10, 105.

Body elongate-ovate, especially in young, strongly compressed.

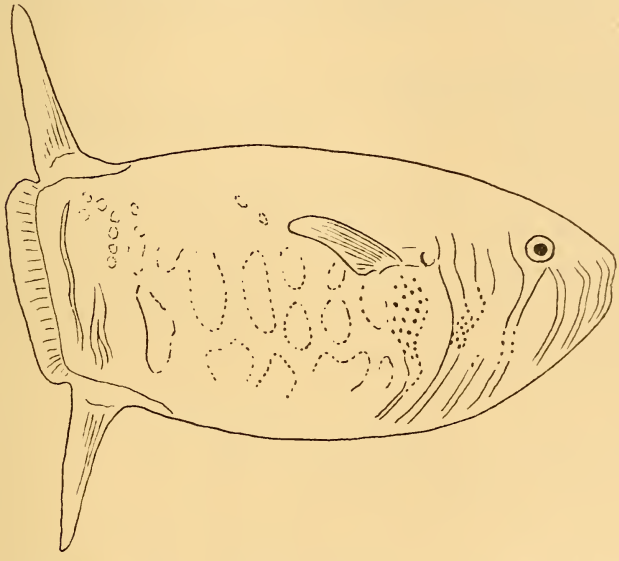


Fig. 32.—*Ranzania truncata.* Semidiagrammatic, to show pattern of markings. From specimen in South African Museum.

Skin smooth, tessellated with small hexagonal plates. Smaller in size than *Mola*. Gill-rakers free, 9–10 on anterior arch, each with a sharp point.

A single widely distributed species is known.

Ranzania truncata (Retz.).

Oblong Sun-fish.

1785. Retzius, Vet. Ak. Nya Handl., vol. vi, pt. 2, p. 116.

1895. Jenkins, Proc. Cal. Ac. Sci., ser. 2, vol. v, p. 780, pl. (*makua*).